Ottawa-Carleton

Region of Ottawa-Carleton
in collaboration with
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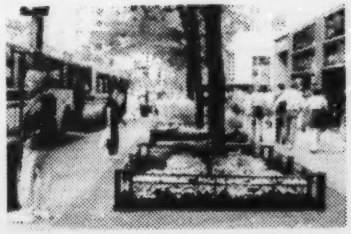

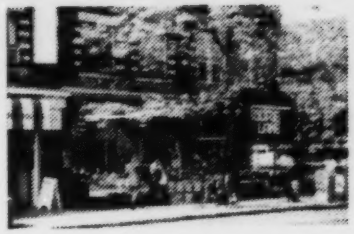

REGIONAL ROAD CORRIDOR DESIGN GUIDELINES

July 2000

DELCAN Corporation
The Planning Partnership

RMOC # 19-68

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1.0 WHY GUIDELINES FOR REGIONAL ROAD CORRIDORS?

There are changing demands on, and expectations of, roadways of all types in urban areas across North America. Roads can no longer be considered as predominantly traffic carrying facilities moving vehicles and goods as efficiently and safely as possible. While this remains a primary objective, particularly for regional roads which have an arterial function, greater consideration needs to be given to the requirements of all travel modes. Road designers and planners must consider the role of the entire road corridor as a public space, and the role of roads in shaping the character, function and livability of adjacent land uses and communities.

This theme is well articulated in Section 6.10 of Ottawa-Carleton's Regional Official Plan (ROP), which provides the impetus for these guidelines:

" Review and modify general design guidelines for all regional roads which address compatibility with adjacent land uses and landscape character. These guidelines will also provide direction for regional roads that perform more specific functions such as mainstreets, Central Area roads, Entry Routes, and roads through special areas such as the Greenbelt or heritage districts. Taking into account the requirements of the anticipated travel modes and the diversity of other activities and users, the guidelines will address the following matters, including specific measures for implementation:

a) *design which is compatible with adjacent land uses and landscape character, such as wider sidewalks, street trees and parking on mainstreets in the urban area and Villages;*

b) *design and maintenance of roadway elements, such as lighting and planting, that are attractive, energy-efficient, cost-effective and durable;*

c) *measures to ensure the safety and security of users;*

d) *any other items considered by Council." (ROP, Policy 6.10.1)*

The ROP also states that the review of roadway design guidelines must, *"incorporate value engineering principles, respect community values and reinforce Council's preference for walking, cycling and transit use over the private automobile"* (ROP policy 9.5.4).

The guidelines focus on the function and design of regional roads in the urban area and villages of Ottawa-Carleton. These roads can be described as urban arterials. Freeways, collector roads, local roads, rural roads, scenic and entry routes and roads through special areas such as heritage districts are not addressed in this document. This work will be done in a later phase.

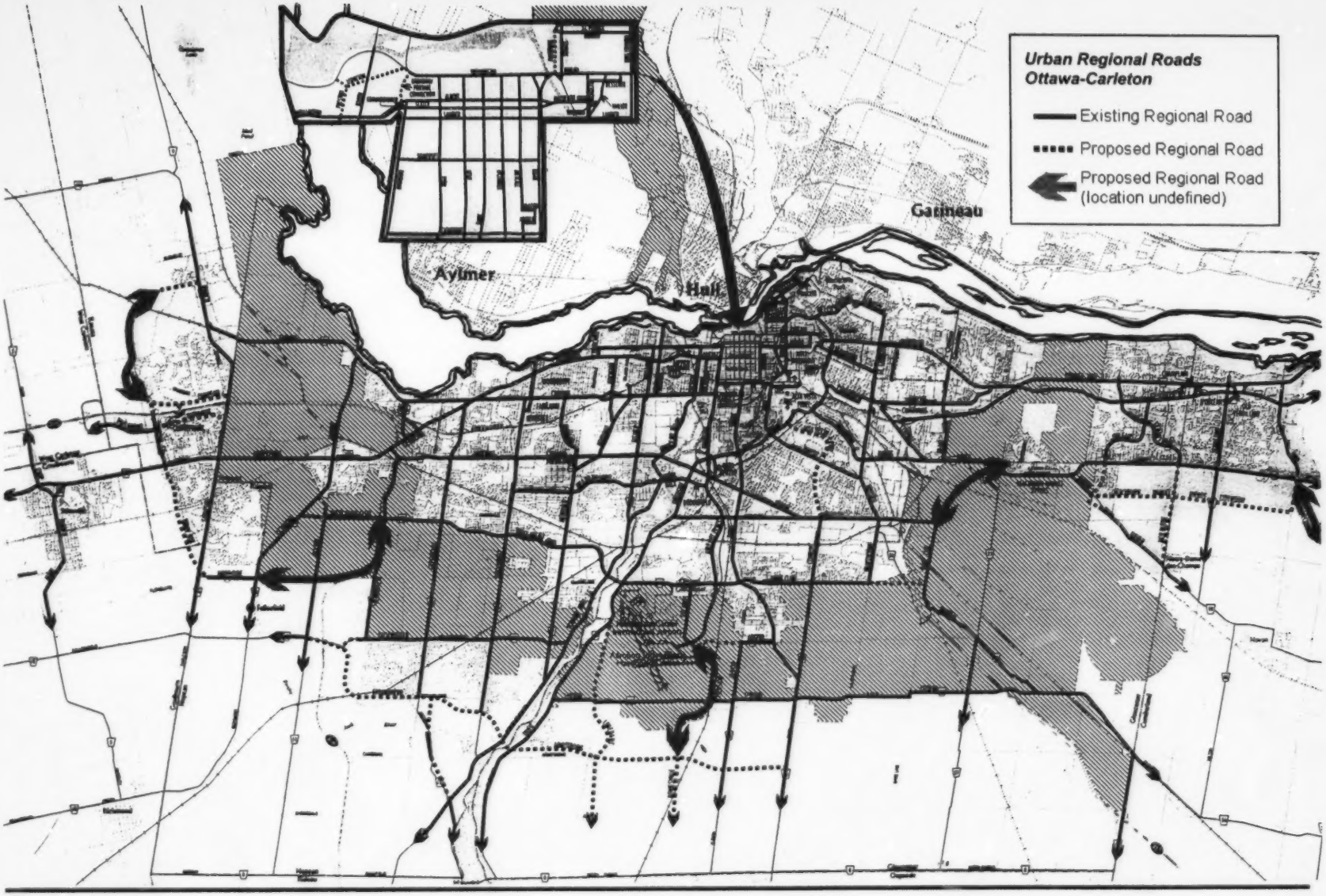
This review of design guidelines for regional road corridors crosses traditional boundaries between land use and transportation planning. While road design focuses primarily on vehicular movement and access to adjacent property, this review focuses on a broader set of design considerations including:

- principles of community livability;
- the multi-modal street function; and
- the character of surrounding land uses.

The term "regional road corridor" refers to both the road right-of-way (ROW) and its interface with adjacent land uses. In a built-up area, the road corridor includes the face-to-face building separation across a road, which includes property outside of the ROW.

During the preparation of this document, the decision was made to restructure the Region of Ottawa-Carleton and the eleven lower-tier municipalities into one new municipality to be named the City of Ottawa. Under the new City of Ottawa, urban arterial roads may or may not be referred to as "regional roads." However, the intent of this document is to apply to all major road corridors. For consistency, they will be called "regional roads."

Why Guidelines for Regional Road Corridors?



2.0 GUIDELINE OBJECTIVES

The two objectives of this document are:

- To recommend design guidelines for various types of regional road corridors which support their public space function, and their compatibility with adjacent land uses and landscape character; and,
- To identify means to implement the guidelines.

The design guidelines complement existing guidelines and regulations for the design of new and reconstructed roads and of adjacent land uses (see the Appendix for a list of existing policies, regulations, standards and guidelines). The intent is to respect traditional design objectives for safety, efficiency, capacity, and maintenance, while integrating objectives relating to compatibility, livability, community building, urban design, cost and environmental impacts. The guidelines will help to implement the vision of a more sustainable transportation system and healthy, vibrant communities as expressed in such documents as the Transportation Association of Canada's (TAC) "New Vision for Urban Transportation." (March 1993)

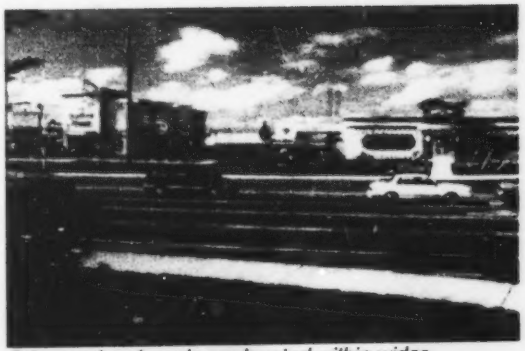
The guidelines can also assist in integrating "traffic calming" into the design of arterial roads. The objective of traffic calming is primarily to reduce the speed of motorized vehicles which in turn creates safer environments for all modes using the road. These guidelines can be read in conjunction with TAC's "Canadian Guide to Neighbourhood Traffic Calming" (December 1998).

In Ottawa-Carleton, regional roads are arterial roads that demonstrate a full range of urban and suburban conditions. The challenge in preparing these guidelines was to ensure the full range of conditions were considered in setting direction for retrofit or new arterial roads.

Regional roads range from mainstreets to commercial streets in suburban areas with large format retail or shopping malls and reverse frontage residential streets lined with noise barriers. The guidelines therefore respond to widely varying conditions: right-of-ways from 20m to 45m; definition of the street space ranging from a building height-to-corridor width ratio of 1:1 to 1:12; number of blocks within 500m ranging from 2 to 9; average block length ranging from 50m to 300m or longer, and, building setbacks ranging from 0 to more than 30m.

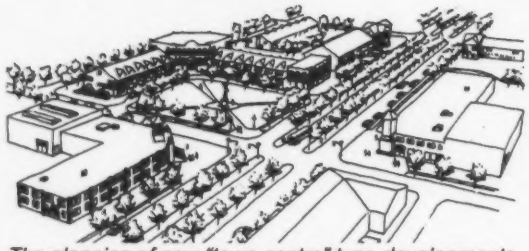
Narrow or wide, with low or high traffic volume, the best roads are the ones that create attractive public places and accommodate pedestrians, cyclists, transit, as well as cars and trucks.

Some regional roads are located within narrow, mixed use corridors in older areas.



Other regional roads are located within wider corridors in suburban locations.

Guideline Objectives



The planning of new "town centre" type developments in suburban locations can benefit from road corridor design guidelines (source: The Planning Partnership, McCormick Rankin, CH2M Gore & Storrie, Area 5/6 Secondary Plan, City of Nepean).

Regardless of the corridor type, these guidelines are intended to help direct the development and redevelopment of regional roads to be the best they can be – the best roads through residential districts in new development or existing urban areas, the best commercial streets, whether they are main streets or commercial corridors in suburban neighbourhoods, or the best roads through employment areas, whether they are in the urban core or suburban business parks. To achieve this requires special attention to the particular qualities and conditions that contribute to the design of a wide variety of regional roads.

In Ottawa-Carleton, which forms part of the National Capital Region, it is particularly important that regional roads assist in communicating the image of the Capital to local citizens and visitors alike.

3.0 HOW WILL THE GUIDELINES BE USED?

The guidelines are intended to be used by:

- Municipal staff involved in road design, land use planning, and maintenance and operations;
- Citizens and elected officials involved in transportation and land use decisions; and,
- Private developers, architects, landscape architects, planners and engineers involved in road design and land use planning.

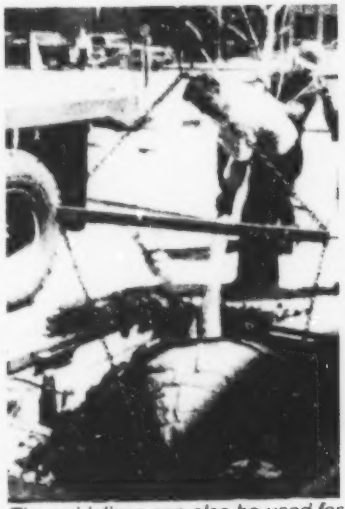
The guidelines have general applicability to municipalities across Canada. However, the guidelines recognize Ottawa-Carleton's winter conditions and harsh growing environment along regional roads. Certain aspects related to snow management and the location of trees and other vegetation will be relevant to communities with similar climatic conditions.

The guidelines should be used in various applications, including the design of new roads, road widenings, and road rehabilitation projects. The guidelines focus on the mid-block segments of the road corridor, although some general guidelines are provided for intersections, driveways and pedestrian crossings.

As the document also deals with lands outside of the ROW, it can also be used when designing new urban areas, as well as in the development of Official Plan policies, Zoning By-law regulations, and Site Plan Control guidelines.

This document provides information and background to assist the road corridor planner or designer in choosing the appropriate combination of road corridor elements. For example, when using the Geometric Design Guide for Canadian Roads (Transportation Association of Canada, September 1999), this document should contribute to the development of the "design domain," a basic concept in roadway design.

The guidelines can be used for the planning or rehabilitation of suburban roads.



The guidelines can also be used for the retrofit of existing roads in urban areas.

4.0 STUDY PARTNERS AND CONSULTATION

A Working Group collaborated with the Project Team during the preparation of the Design Guidelines:

Robin Bennett, *Regional Cycling Advisory Group*
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Chris Bradshaw, *OttaWalk*
Allan Cameron, *City of Kanata*
Sandra Candow, *City of Gloucester*
Tim Chadder, *Township of West Carleton*
Guy Cormier, *Village of Rockcliffe Park*
Sue Cragg, *Canadian Fitness and Lifestyle Research Institute*
Susan Fisher, *Canada Mortgage and Housing Corporation*
David Glastonbury, *Board of Trade*
Kevin Grace, *Township of Osgoode*
Linda Hoad, *Federation of Citizen Associations*
Craig Huff, *Regional Forester*
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Dennis Jacobs, *City of Nepean*
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John Smit, *City of Ottawa*
Peter Steacy, RMOC
John Wright, *Corush Sunderland Wright Ltd*

Several agencies came together to support this study. The *Region of Ottawa-Carleton* (Region), in collaboration with *Canada Mortgage and Housing Corporation* (CMHC), and *Go for Green* funded this study. The study complements and benefits the policy and research activities of CMHC, which pursues sustainable community development on a national basis. The Go for Green Active Living and Environment program is a Canadian non-profit initiative with participation of the Federal government and all 13 provinces and territories. The program explores ways to improve the health of individuals and the environment. On this basis, the design of major roadway corridors is core to the interests of both CMHC and Go for Green, as well as the interests of the Region as expressed in the Regional Official Plan.

In addition, local municipalities, agencies and interest groups have partnered with the Region through their representation on a "Working Group" which met regularly during the preparation of the guidelines. The study involved other stakeholders to share information and work together to identify design solutions, through consensus, as much as possible.

Key elements of the study's consultative process included:

- Establishment of the Working Group;
- Research, by Regional staff (with input from the Working Group), on the performance evaluation of representative regional roads;
- Selection of a consulting team to assist in the review and develop the guidelines (Delcan Corporation and The Planning Partnership);
- Numerous Working Group sessions;
- Two meetings with Regional and municipal staff on technical matters;
- Two public meeting/forums; and,
- Circulation of draft reports for formal review.

5.0 WHAT IS A REGIONAL ROAD?

Regional roads are arterial roads which form the network of major travel routes throughout Ottawa-Carleton. They are expected to move the greatest traffic volume and the most diversity of travel modes including pedestrians, cyclists, buses, cars, trucks, and emergency service vehicles.

Regional road rights-of-way range from about 20m to 45m. Some regional roads are in older urban areas where land uses define a narrow corridor, and where widening potential is limited or not appropriate. Other existing and planned roads are located in suburban settings where wider corridors have been protected or are available. Urban regional roads traverse all land use contexts, including the central area, new and old residential areas, linear commercial districts including mainstreets, institutional and government precincts, business parks and other employment areas, future town centres, village cores, and the transition zones between these areas.

Being arterial routes, all regional roads carry high traffic volumes. However, high traffic volumes do not necessarily jeopardize a road's ability to be multi-modal or to create good public spaces in both urban and suburban settings, in wide or narrow road corridors.

It is interesting to note that Bank Street, a classic main street, with four lanes in an 18.5m ROW with intersecting streets every 50m, carries the same peak hour traffic volume as Baseline Road, a typical suburban four lane thoroughfare, in a 46m ROW with blocks every 300m.

A narrow four-lane main street.

A wide four-lane suburban road.

Road corridors can be safe for pedestrians, cyclists and vehicles.

In areas of high pedestrian traffic, road corridors should provide amenities to ensure a safe, well defined and comfortable public space, i.e. benches, floral displays, trees and decorative lighting and spacing.

6.0 FIRST PRINCIPLES - THE VISION

The design guidelines are based on a set of "First Principles" for regional road corridors. They have been derived from various sources including existing policy, lessons learned locally and elsewhere, relevant literature, and stakeholders' input.

The First Principles for regional road corridors are organized in accordance with the corridors' four basic functions. Each regional road corridor functions, to varying degrees, as a:

- Public Space;
- Access Provider;
- Multi-Modal Route; and,
- Service and Utility Route.

It is important to note that these four functions are not always entirely complementary. For example, it is often difficult to develop a desirable public space along a high speed arterial road. The pre-eminence of the various functions, therefore, often varies by road corridor type. This is the challenge the guidelines must address.

6.1 Public Space Principles

Allan Jacobs wrote, in Great Streets (1995), *"If we can develop roads that are attractive public spaces, community-building places, then we will have successfully designed one third of the city and will have an immense effect on the rest."* As a public space, roads should be safe, comfortable, barrier-free, pleasing to the eye, used by many, and a source of civic pride. They are a place for social interaction. To function as a public space, regional road corridors should be:

1. **Secure**: Regional road corridors should be safe and friendly areas for pedestrians and cyclists, and for adjacent residents and businesses.

2. **Comfortable**: Regional road corridors should maximize the physical comfort of pedestrians and cyclists, and of adjacent residents and businesses, through mitigation of the environmental effects of temperature, sun, rain, snow, wind, lighting glare, visual, noise, and air pollution.

3. **Convenient**: Regional road corridors should be convenient for their users by providing amenities, accessibility, signage, and integration with adjacent uses, as well as the ease of travel along the corridor.

4. **Engaging to the Eye**: Regional road corridors should have qualities that engage the eye through the creative combination of road elements such as trees and vegetation, lighting, signs, furniture, public art, utility infrastructure, and the definition provided by adjacent landscaping and buildings.

5. **Spatially Defined**: Regional road corridors should be designed with regard for the massing, height and setback of adjacent buildings and landscaping to define human-scaled spaces.

6. **Green**: Regional road corridors should maximize the amount of vegetation as an attractive element of public space, to green the urban landscape and to create public spaces and green ways.

7. **Universally Accessible:** Regional road corridors can contribute to the diversity of urban areas by hosting land uses and public spaces where people of all levels of physical ability, from all walks of life and from other communities can meet and interact without barriers.

6.2 Access Provider Principles

Regional roads provide access and/or exposure to lands located adjacent to them. The degree of access ranges from public street intersections, to consolidated vehicle driveways, to individual lot driveways, to pedestrian access only, to no access at all, to visual marketing exposure only. The use and design of the adjacent built form and the type of access are important determinants of the character and function of a road corridor. To best provide access and exposure, regional road corridors should be:

1. **Properly Spaced**: Block length and intersection spacing along regional road corridors should be designed to accommodate all transportation modes including walking, cycling, and public transit.

2. **Access-Controlled**: Vehicular access to individual lots adjacent to regional road corridors should be controlled to minimize turning movements and to reduce conflicts between all travel modes. Opportunities for direct pedestrian and cyclist access should be maximized.

3. **Connective**: Regional road corridors should provide a high degree of connectivity between land uses and places along and across the route.

Large format retail stores can be set close to the street edge, with pedestrian-scaled architecture and streetscape treatment.

Extensive vegetation greens the urban landscape, creating attractive public spaces and contributing to a sense of spatial enclosure.

Buildings can have direct pedestrian access to roads, with limited vehicular access.

Good public transit stops provide wide, clear loading zones and passenger amenities such as shelters and benches.

This includes accessibility and mobility for all users to and from adjacent land uses as well as the communities that flank the corridor.

4. **Continuous**: Regional road corridors should provide for visual and functional continuity, both for uses and activities along the corridor, and for uses and activities across the corridor.

5. **Revealing**: Regional road corridors should provide exposure to adjacent users requiring visibility, while managing the quantity and quality of signage and landscaping both within the road allowance and on adjacent lands.

6.3 Multi-Modal Route Principles

The high capacity, high diversity function of regional roads distinguishes them from the remaining hierarchy of the less-travelled public roads. To function as multi-modal routes, regional road corridors should be:

1. **High-Capacity**: Regional road corridors should continue to accommodate the highest volume of people, goods and services through a diversity of travel modes, and their design should facilitate the safe and efficient movement of these modes.

2. **Safe**: The design of regional road corridors should maximize safety for all travel modes and users. Integrating various traffic calming measures into the design of new or rehabilitated roads may be appropriate. Applying such measures should not displace traffic to adjacent non-arterial roads, unduly compromise transit service, or jeopardize emergency vehicle response.

3. **Prioritized For Pedestrians, Cyclists and Transit Users**: Regional road corridors should place a priority on walking, cycling, and public transit use, over the use of the private automobile.

4. **Pedestrian Supportive**: Regional road corridors should have sidewalks along both sides and other pedestrian friendly features, and should contribute to the pedestrian and cycling linkages within and between communities.

5. **Cycling Supportive**: Regional road corridors should provide features to promote safe and efficient cycling. Roads that form part of the Cycling Transportation Network (CTN) should provide for on-road commuter cycling needs to the greatest extent possible.

6. **Transit Supportive**: Regional road corridors that serve as public transit routes should include an enhanced level of features, facilities and connectivity for pedestrians, to promote transit use. Buses should have equal or greater priority than other vehicular traffic.

7. **Heavy Vehicle Compatible**: Most regional road corridors serve as routes for trucks, buses, and emergency service vehicles. They should be designed to facilitate the safe and efficient movement of large and heavy vehicles. This will minimize vehicle conflicts with pedestrians and cyclists, mitigate environmental effects and reduce maintenance costs of both the road and the vehicles.

6.4 Service and Utility Route Principles

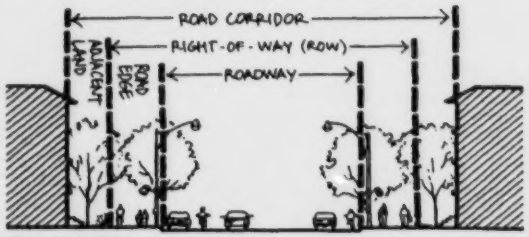
Regional roads accommodate a range of municipal services such as piped water, sanitary sewers, and storm sewers, as well as utilities such as hydro, telephone, gas and telecommunications (cable, telephone, data, etc.). The services are typically underground, yet hydro, telephone and cable may be mounted on poles. Trees are also part of the public infrastructure. Providing suitable vertical and horizontal space is an important design challenge. The maintenance and operation of this infrastructure, and of the road corridor itself, are also important design considerations. To function as a service and utility route, regional road corridors should be:

1. **Infrastructure Compatible**: Regional road corridors should continue to provide the required horizontal and vertical space for municipal service and utility infrastructure.

2. **Vegetation Supportive:** Vegetation in the road corridor should be considered as part of a connected system of underground, at-grade and overhead infrastructure. The integrity and continuity of the system should not be compromised or broken. The green infrastructure promotes oxygen production, carbon dioxide absorption, ground water infiltration, noise and light attenuation, snow drift management, and airborne particle collection.

3. **Operable and Maintainable**: Regional road corridors should be based on designs which address the life-cycle costs and ease of maintenance of the infrastructure. Materials, construction techniques and scale of the road corridor elements should be selected to ensure durability and quality.

Transit shelters can form public space nodes.



Road corridor components.

Mixed use and higher densities along regional roads promotes multi-modal 24 hour use.

7.0 DESIGN GUIDELINES FOR CORRIDOR COMPONENTS

Each regional road corridor is composed of several distinct components. It is the successful design and combination of these components that create efficient and liveable communities where the end product is greater than the sum of the parts. This chapter provides guidelines for the components. They are intended to provide a framework or palette of conditions that can be combined during the planning and design of individual road corridors.

The road corridor components have been organized into five groups:

- Adjacent Lands;
- Road Edge;
- Roadway;
- Intersections, Driveways and Pedestrian Crossings; and
- Linear Services and Road Operation.

7.1 Adjacent Lands

Land uses adjacent to regional roads contribute to, and greatly influence, the road character and function. For example, a regional road in a downtown commercial setting will have different characteristics than in a suburban business park setting. The densities, orientation, quality of buildings, and quality of on-site landscaping determine the character and function of the road corridor.

7.1.1 Urban Form and Connectivity

Neighbourhood design components such as street pattern, intersection spacing, pedestrian and cycling linkages, building height and setbacks, building density and land use mixes have an important influence on road corridors. Good urban form can help create pedestrian-friendly and transit-supportive road corridors.

1. Plan an overall vision for the regional road corridor to direct decisions regarding urban structure in individual/ community/neighbourhood plans.

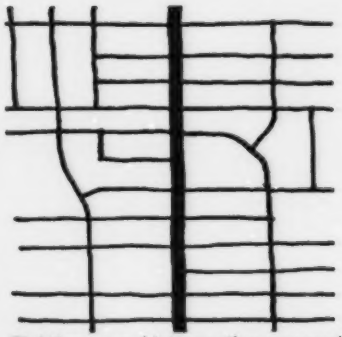
2. Where appropriate, plan regional road corridors as special urban districts, ideally with mixed land uses and higher densities within adjoining communities, to promote the multi-modal 24-hour use of the corridor.

3. Ensure that regional road corridors will act as community "integrators" rather than "dividers" by having land uses and built form relate to the road and avoid back-lotting (reverse frontage). Consider subdivision and site plan design for adjacent lands, which includes parallel local streets, frequent intersections, short blocks, side-lotting, and front-lotting with rear access.

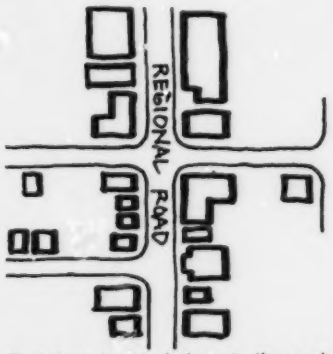
4. In the cases where regional roads separate significantly different land uses (i.e. residential from retail or business park), tie the two land use edges together to maximize community integration. Accomplish this through consistency in landscape treatment, lighting, building setbacks, building heights, and signage.

5. Encourage a grid street and block pattern with frequent intersections to promote accessibility, connectivity and continuity along and across the corridor. To achieve a highly urban corridor, design blocks with intersecting side streets every 50 to 100m and signalized intersections every 100 to 150m.

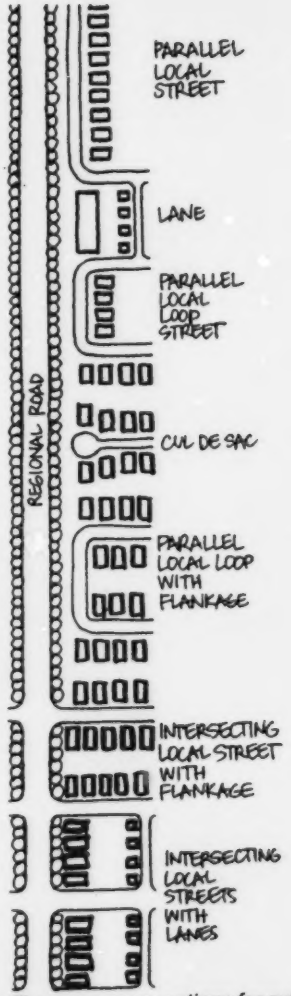
6. Provide frequent pedestrian connections from adjacent lands to the regional road by including direct pedestrian routes between buildings or adjacent communities to road sidewalks.



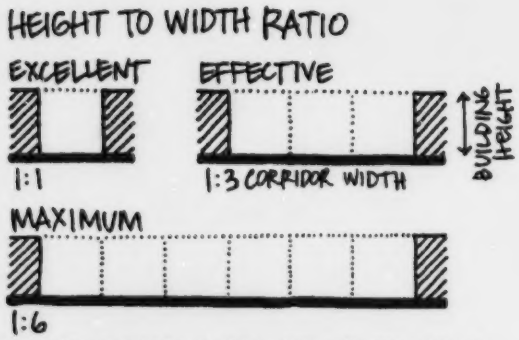
Tightly spaced intersections promote connectivity, continuity and access.



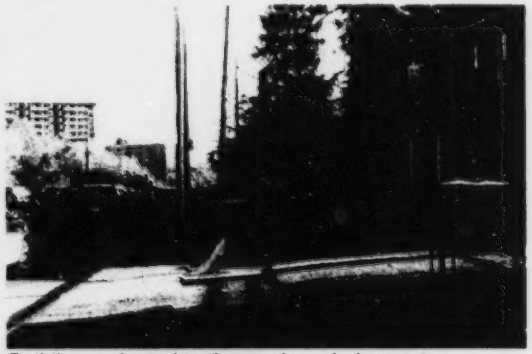
Buildings located close to the regional road help create continuity and spatial definition.



There are many options for subdivision and site plan design to avoid reverse frontage along regional road corridors.



A building height-to-corridor width ratio (the ratio of building height to the distance separating building facades on either side of the street) of 1:1 or lower is appropriate for urban core areas. A ratio of 1:2 to 1:3 is ideal for main streets and urban residential areas. A ratio of 1:6 or greater should be avoided (The Technique of Town Planning, Operating System of The New Urbanism, Duany Plater-Zyberk Company, 1997.)



Buildings oriented to the road can help create a human scale.

Options to reverse frontage include local streets parallel to the regional road.

7.1.2 Building Design and Orientation

The location, scale, design, orientation and continuity of buildings influence the spatial quality and function of a regional road.

1. Locate buildings close to the ROW with direct pedestrian access to facilitate pedestrian activity and an opportunity to establish a human scale.

2. In traditionally narrow urban corridors respect the existing building edge and maintain the continuity with new infill buildings.

3. Make creative use of surface easements, setbacks, cantilevered buildings, etc., to create a wider pedestrian zone while maintaining streetscape continuity, where the existing corridor width is constrained.

4. Conserve historic urban fabric along the corridor to maintain diversity and enrich the experience of corridor users.

5. In new residential communities, consider orienting houses to face the road, as the preferred alternative to reverse frontage.

Design Guidelines for Corridor Components

6. When retrofitting suburban corridors, infill parking lots with new buildings at the street edge.

7. Design the building height-to-corridor width ratio to be as small as possible (i.e. 1:1 to 1:3) to create a defined corridor.

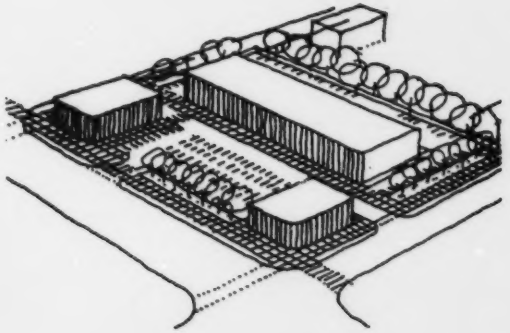
8. As an alternative to large format retail, arrange buildings as a series of smaller boxes located at the street edge, especially where high pedestrian activity exists or is desired.

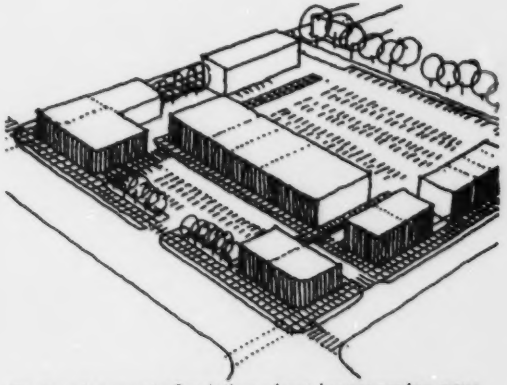
9. Articulate the façade, or vary wall materials along the length of large format buildings to avoid long blank walls.

10. Provide windows and doors facing the road for direct pedestrian access and "eyes on the street." Ensure that windows and doors occupy at least 50% of the building façade.

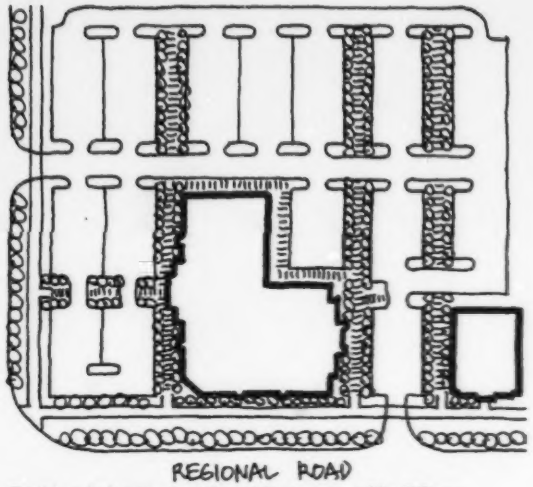
Locate buildings at the street edge to define the corridor space.

Articulate the façade and vary wall materials along large format retail buildings.



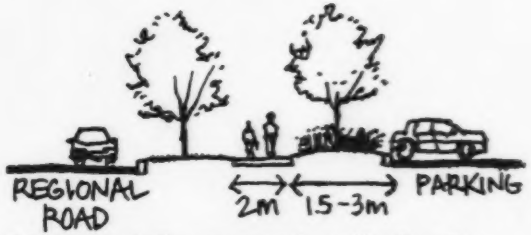


Redevelopment of existing plaza incorporates new buildings to define street edge (The Planning Partnership, duToit Allsopp Hillier, Delcan Corporation, Merivale Road Urban Design Guidelines, for the City of Nepean).



Parking is located at the side or rear of buildings. Sidewalks in the parking area connect entrances and the street.

A fence can help screen a parking lot and define the street edge when buildings are set back.



A landscape buffer can separate parking from the pedestrian zone.

7.1.3 On-Site Parking and Circulation

The treatment of parking areas has a key influence on the visual character of a regional road corridor.

1. Locate parking lots to the side or rear of buildings to mitigate their visual impact on the streetscape, to minimize the need for landscape screening, and to permit buildings to be located closer to the road. Locate adequate bicycle parking near building entrances.

2. Screen parking lots that abut regional roads. This screening should be 1.5 to 3m wide with trees, shrubs, berms, and/or low fences, except within sight triangles at driveways or intersections. Low level screening should be 0.75 to 1.0m high to mitigate views of parked cars yet retain a sense of personal security for parking lot users.

3. Design parking lots to be safe places. Ensure that parking areas are well lit and accessible from the roadway and from adjacent buildings with clear views. Ensure that parking lot screening features do not exceed 1m in height and provide escape breaks.

4. Include barrier free sidewalks within parking lots to accommodate pedestrians walking to the building entrance. These sidewalks should be 1.5 to 2.0m wide. They can be combined with landscape strips and lighting to assist in their delineation to enhance way-finding and to provide shaded areas in the parking lot.

5. Provide sidewalks that connect buildings to the roadside sidewalk and transit stops. These do not always have to be combined with vehicle driveways.

6. Connect buildings and parking lots of adjacent properties with vehicle aisles and barrier free sidewalks to allow the off-road circulation of vehicles, cyclists, and pedestrians between sites.

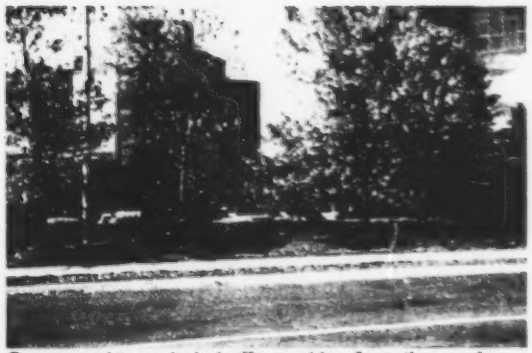
7. Encourage shared parking lots to reduce overall parking requirements and to integrate adjacent uses. Achieve this through zoning and by reciprocal operating agreements between owners.

8. Locate loading, garbage and other services so they are not visible from the road.

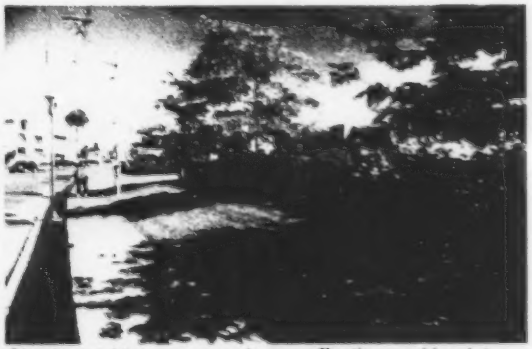
A pedestrian walkway through a parking lot addresses the street with architectural and landscape elements.

Barrier free sidewalks in parking lots can be combined with landscape treatment and distinctive surfaces at pedestrian crossings.

Pedestrian routes between buildings and sidewalks enhance connectivity within the corridor, even if the entrances do not front the road.



Berms and trees help buffer parking from the road.



Shrubs and trees can make an effective parking lot screen.

7.1.4 On-Site Landscape

The landscape treatment of lands outside of the ROW can enhance the visual character of the corridor.

1. Develop overall landscape concept plans or themes for regional road corridors to enable integration and consistency in the individual landscape plans of land owners adjacent to the road, and to facilitate coordination of landscaping within the ROW with that on private lands.

2. Include a variety of trees to safeguard against the effects of disease related to individual species.

3. Continue to require that landscape plans be included as part of the design requirements for new or reconstructed regional roads, and as part of development applications for adjacent sites.

4. Allow private developers to extend on-site landscaping into the ROW when desirable, and confirm the ongoing care of this landscaping through a maintenance and liability agreement.

5. Coordinate on-site landscaping along the length of the road corridor with other sites on both sides of the road through Zoning, Site Plan Control, Condominium and Subdivision Approval.

Landscape strip between parking areas can break up large asphalt areas and can be integrated with pedestrian routes. Sidewalks should be barrier free.

7.1.5 On-Site Signs

Signs are an important aspect of commercial activity and can influence the visual character of a road. Besides being an important economic tool, they also present an opportunity to create a lively urban environment.

1. Design ground-mounted and wall-mounted signs to be in scale with the adjacent buildings and land uses in terms of height, width and surface area, and to avoid a cluttered streetscape. Prescribe maximum signage area, or regulate sign area as a percentage of the wall to which it is attached. Consider 6m as a maximum height for pylon signs.

2. Use shared-use or joint signs to reduce sign clutter.

3. Integrate landscaping features with the base of ground-mounted signs.

4. Regulate the use of temporary or portable signs to minimize the amount of sign clutter near the road edge, to keep sight lines as open as possible and to prevent encroachment in the effective walking area of the sidewalk.

5. Encourage wall-mounted projecting signs in pedestrian-oriented areas, but require them to be 2.5m above the sidewalk or higher (above head level).

6. Provide setbacks of at least 1m from the ROW for ground-mounted signs so they do not obscure the view of pedestrians, cyclists or motorists at intersections, driveways, or along sidewalks, and prohibit them in corner sight triangles.

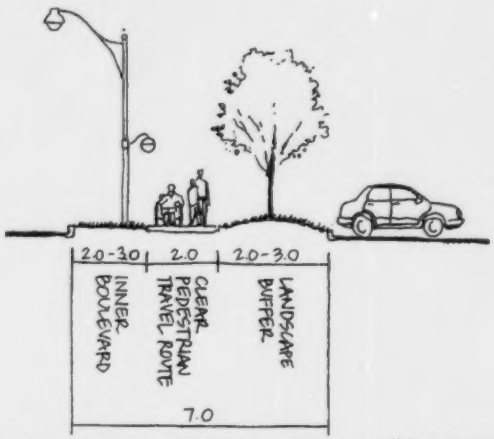
7. Prohibit signs with flashing, animated, pulsating, rotating, or otherwise moving components, so that road users are not distracted.

8. Consider prohibiting the erection of large billboard signs.

Shared signs reduce sign clutter.

Wall-mounted projecting signs favour pedestrians.

Sidewalks in urban contexts with zero building setbacks such as main streets should include a clear pedestrian travel route, furnishing zone and a frontage zone.



The road edge in suburban contexts with wide ROWs should include 2 to 3m inner boulevard, a 2m pedestrian travel route and a 2 to 3m landscape buffer where there is road side parking. This buffer can be within the ROW, on adjacent lands, or shared.

7.2 Road Edge

The road edge is the land between the road curb and the ROW limit, often referred to as the boulevard. Trees, turf, lights, utilities, road signs, sidewalks, recreation paths, paved surfaces, and street furniture are located in this zone, and various arrangements of these components are possible. The boulevard should have a sense of pedestrian scale, enclosure and provide a high level of amenity.

7.2.1 Pedestrian Routes

The sidewalk is a critical component in the design of public rights-of-way. It defines the main pedestrian thoroughfare that is vital for accessing the adjacent buildings and lands and for travelling along the corridor.

1. Provide barrier free sidewalks along both sides of all roads. In business parks it is acceptable (although not preferred) to have sidewalks along only one side of the road.

2. Provide an effective sidewalk width (clear pedestrian travel zone) of at least 2m to allow for the simultaneous passage of a pedestrian and a wheelchair. Before compromising the 2m width, consider reduction of medians, boulevards, or lane widths. Under no circumstance should the effective sidewalk width be less than 1.5m.

3. Provide wider sidewalk widths of 3m or greater for locations with high pedestrian volumes such as in core urban areas, along mainstreets, and in Town Centres.

4. In urban contexts with zero building setbacks, the area between the curb and building should ideally be a minimum of 4.25m wide. It should include a 2m wide furnishings zone at the curb for street trees, lights, benches, etc; a 2m wide clear pedestrian route and a 0.25m frontage zone.

5. For wider roads in suburban contexts, the road edge should be a minimum of 6 to 7m wide to accommodate a 2m wide clear pedestrian travel route, a 2 to 3m wide landscape buffer and a 2 to 3m wide inner boulevard.

In urban areas, provide a clear pedestrian route with trees, lights and furnishings located adjacent to the curb to define the pedestrian zone.

6. Separate the sidewalk from vehicle lanes by trees, landscape strips, light standards, utility poles, parking meters, signage, transit shelters, etc., to enhance the sense of security for pedestrians and to improve splash protection.

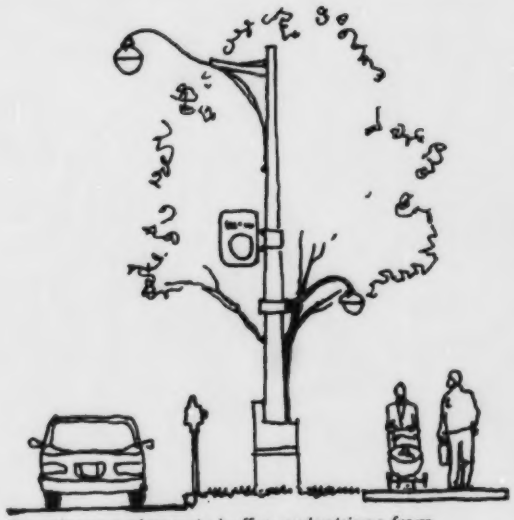
7. Protect pedestrians from the effects of sun, rain, snow, and wind by the creative use of building insets, cantilevered buildings, overhangs, tree canopies or wide storefront awnings to prevent drips on pedestrians.

8. Include recreational pathways within road rights-of-way instead of a sidewalk only when there is no alternative route to maintain continuity in the pathway system. At intersections, the recreational pathway should be located and controlled similar to a sidewalk crossing. Pathways serving as sidewalks should be cleared of snow.

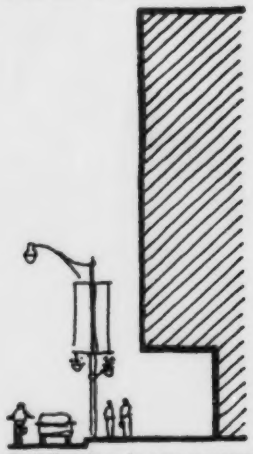
9. Construct recreational pathways with asphalt and at a width of 3 to 4.5m, depending on the volume and mix of users, with 1m clear zones on either side.

10. Apply international standards for surface treatments as cues for warning and direction for visually impaired pedestrians.

Protect sidewalks with awnings, building overhangs or trees.

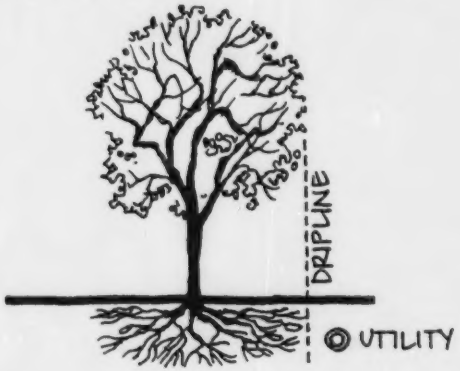


Streetscape elements buffer pedestrians from vehicular traffic and its effects.



Building insets can augment sidewalk space where the ROW is restricted.

Planting beds provide ideal growing conditions for trees and other vegetation.



7.2.2 Road Edge Landscape

The effective combination of landscape elements can have the greatest effect on the environment for pedestrians and other road corridor users. These landscape elements include trees, shrubs, grasses, sod, paving stones and other hard surfaces.

1. When selecting trees, shrubs and other vegetation, consider their tolerance to road salt, subsoil limitations, heat, drought, strong winds and shade.

2. Select species that are native to the Region over non-native species of equal suitability.

3. Select landscape elements (trees, shrubs and decorative hard surfaces, etc.) that integrate with the character of the landscape and buildings.

4. Select deciduous trees when planting along sidewalks or recreation paths, as they provide shade in the summer and allow sunlight to penetrate in the winter. Supplement with conifers where space permits.

5. Consider the height and spread of trees and shrubs and their roots, at maturity, in relation to above-ground and below-ground infrastructure. Do not place services within the tree dripline unless they are buried 2m or more.

6. Select a diversity of trees and shrubs that are easy to transplant, quick to establish and easy to maintain. Select species that are resistant to diseases and insects, have a long life cycle, produce few seeds, flowers and fruits and have a root system which is non-invasive.

7. Plant shrubs, tall grasses or wildflowers where trees are not possible due to ROW, space, height or operational limitations.

8. Provide trees with a clear, permeable surface area of approximately $10m^2$ minimum. Where possible, an area equal to the size of the expected tree canopy is desired. In an urban context, ensure that the clear tree planting area is a minimum 2m wide by 2m deep continuous trench of planting soil.

9. Plant two trees when one live one is removed. Plant one tree to replace one that is dead or dying.

10. If the inner boulevard is less than 1.25m, make every effort to widen the boulevard to increase the survivability of turf and trees in this space.

11. When there is insufficient ROW, plant on adjacent lands under an agreement with the private landowner.

On narrow, lower speed roads with a high potential for pedestrian traffic:

12. Plant deciduous trees between the curb and the sidewalk to enclose and shade the pedestrian space. Plant trees 1 to 1.5m from the curb (0.75m minimum).

13. Plant deciduous trees approximately 6 to 8m (10m max.) apart to provide a continuous canopy along the corridor.

14. Plant trees at grade. Unless there are specific design directives, use raised planters only where there are significant conflicts with utility infrastructure. Planters should have a minimum interior dimension of 1.5m in any direction and no bottoms. They can also be designed to provide seating where appropriate.

On wider, higher speed roads with lower potential for pedestrian traffic:

15. Plant deciduous trees well away from the curb, preferably behind the sidewalk to mitigate salt spray, wind, fumes and reflected heat that are harmful to the trees. This also assists with screening surface parking and with defining the public space.

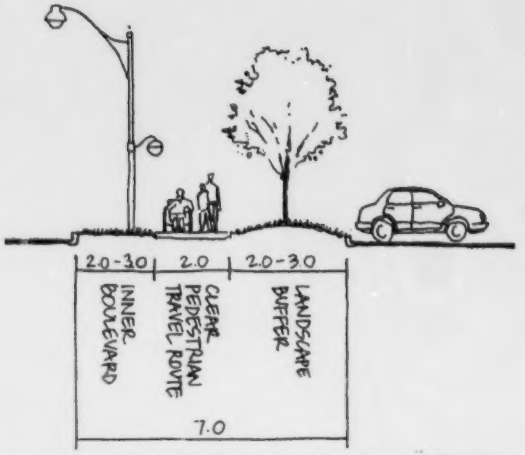
16. Plant trees in clusters. Use a mix of conifers and deciduous trees to enhance landscape diversity. If planted in-line, plant them 10m apart.

17. Where trees are desired close to the road edge between the curb and sidewalk, provide a 4m inner boulevard and plant the tree 2.75m +/- from the curb, leaving room for snow storage beside the sidewalk and roadway.

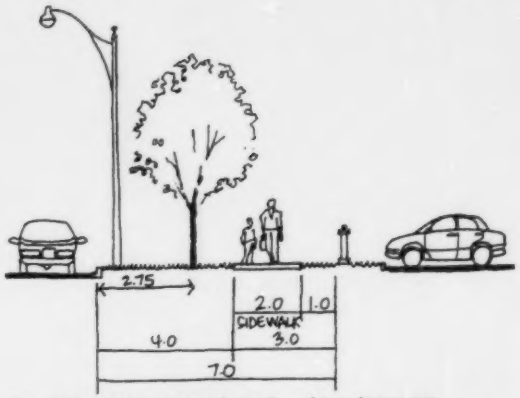
18. Preserve and protect existing healthy trees in the corridor by modifying the location of sidewalks, driveways, utilities, etc.

19. Enhance the success of road edge landscaping through proper installation, soil preparation and long-term care.

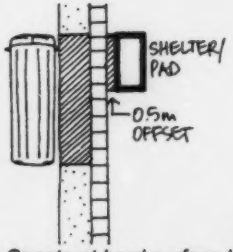
Trees and shrubs located away from the curb help screen parking and define public sidewalk space.



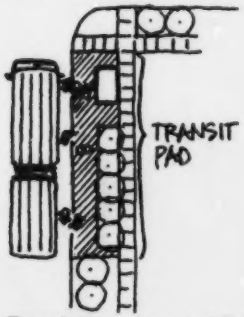
On higher volume/speed roads, plant trees well away from the curb.



On wider, higher speed roads, where trees are desired close to the road edge, plant 2.75m± off curb, in a 4m wide inner boulevard.



Construct hard surface loading pads when the transit shelter is located in the outer boulevard flush with the sidewalk to provide full accessibility.



Transit stops have a 1.5-2.0m wide loading pad adjacent to the curb and are as long as the vehicles they serve.

Consider site specific design of transit shelters.

7.2.3 Transit Stops and Shelters

Transit stops have the potential to be centres of activity along regional roads. Space needs to be dedicated for transit stops, shelters, and related furniture.

1. Construct concrete pads at all transit stops where space is available. Erect shelters on the pads when budget and ridership permit.

2. Locate shelters in the outer boulevard to maximize passenger convenience, unless there is a wide inner boulevard available and/or high pedestrian and passenger volumes which could create conflicts on the sidewalk.

3. Ensure a clear hard surface area 1.5 to 2m wide in front of a shelter to permit safe exit by passengers, including wheelchair users. The sidewalk will often provide this space. In all cases, shelters should be set back 0.5m from curbs and sidewalks to protect them from damage by snow plows.

4. Design curb-side transit stop loading areas 1.5-2m wide and long enough to serve both the front and rear doors of the longest transit vehicles using the route (articulated buses).

5. Locate transit stops as close to intersections as possible, and coordinate their location with neighbourhood path connections and building entrances.

6. Consolidate benches and other roadside furniture such as waste baskets, bike racks, telephones, notice boards, newspaper boxes and refuse containers at bus stops to maximize their barrier free utility and create active public spaces.

7. Incorporate surface texture changes at transit stops to assist the visually challenged in locating the stop and/or shelter location.

8. Design transit shelters with transparent sides at eye level for maximum visibility to and from the interior, so that transit users can see approaching buses, and for personal safety reasons.

9. Where four-sided transit shelters are not possible, consider overhead open air canopies as an option to protect transit users from sun, rain, and snow.

10. Pursue innovative ways to design and deliver transit shelters and related furniture. Consider public-private funding partnerships, or integrate them into development on adjacent lands where the location suits transit user needs. Ensure that the emphasis is on amenity over advertising.

7.2.4 Furniture, Amenities and Art

Street furniture such as benches, phone booths, parking meters, bicycle racks, newspaper boxes, waste receptacles, planter boxes and mail boxes can make road corridors more comfortable and convenient, and can add variety to the streetscape.

1. Enhance the urban design quality of the road corridor by improving the quality of street furniture, sign posts, light and signal poles, etc. Identify priority corridors (such as historic areas, downtown and town centres and special commercial districts), and develop a plan.

2. In narrow corridors, cluster roadside furniture and amenities in-line between the curb and the sidewalk, to separate pedestrians from vehicles and cyclists travelling on the adjacent roadway. On wider, higher-speed roads, place them in the outer boulevard.

3. Locate roadside furniture, patios, roadside vending activities or sandwich board signs so they do not compromise a clear pedestrian route of 2m or greater.

4. Locate roadside patio umbrellas or awnings that encroach into the ROW so they are well-above the head level of pedestrians and cyclists.

5. Encourage owners in commercial areas to add their own street furniture, such as benches or shelters, in appropriate locations, subject to maintenance and liability agreements, when located in ROWs. This furniture should be consistent with the site's particular context and streetscape concept.

6. Encourage the location of public art (including sculptures, wall murals, fountains, decorative walls, custom designed furnishings) within or adjacent to the ROW to enhance the streetscape.

7.2.5 On-Road Signs

Public signs erected within the ROW are regulated by provincial manuals and are typically related to vehicle operation and parking regulations, or are provided for directional or information purposes.

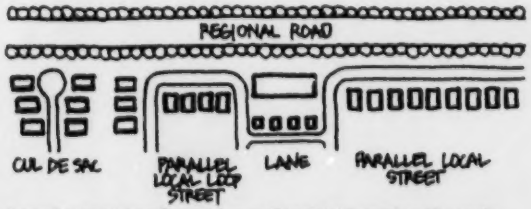
1. Mount on-road signs on existing utility or light poles, where practical.

2. Design individual ground-mounted signs to be in scale with the adjacent buildings and the streetscape.

Locate patios and other roadside amenities so that they do not compromise a clear pedestrian route.

Enhance the character of roads with well designed streetscape features.

If reverse frontage is necessary, a wide greenway provides open space and connects natural features.



Local street configuration adjacent to regional roads can avoid reverse frontage and noise walls

New residential development with local loop streets adjacent to a regional road.

3. Locate signs in-line with other features in the road edge such as parking meters, street furniture, light poles, and utility poles.

4. Design and locate on-road signs so as not to obstruct the view of traffic signals and other important sight-lines of pedestrians, cyclists, or motorists.

7.2.6 Noise Attenuation

Regional roads generally have high traffic volumes, and have the highest speed limits in suburban locations. These roads also carry buses, trucks, and other heavy vehicles. This results in sound levels which irritate people adjacent to the roadways and possibly warrant noise attenuation. In these cases, Provincial and municipal noise level guidelines apply.

1. In the design of residential and institutional projects, locate outdoor at-grade amenity areas away from the regional road, and consider building orientations and local street configurations which eliminate the need for noise attenuation. Use the building to attenuate noise.

2. Where private development is proposed adjacent to a regional road, require the developer to be responsible for the project's on-site adherence to Provincial and municipal noise guidelines and confirm this during the site plan, subdivision, condominium, and/or building permit approval processes.

3. Use traffic calming measures and design the road to reduce the speed levels and road noise. A reduction in speed of 10 km/h reduces noise levels by approximately two decibels.

4. When the growth in traffic has resulted in noise levels that exceed Provincial and municipal guidelines, consider retrofitting with noise attenuation measures on a case by case basis.

5. Where noise attenuation is required, consider alternatives to noise walls, such as well landscaped berms that could also provide open spaces, trails, and connect natural features.

6. Design openings in noise walls for bicycle and pedestrian access so that noise exceeding Provincial or municipal guidelines does no leak through to the community.

7. Where noise walls are used, plant vines, shrubs or trees to visually break up the fence and avoid a blank wall.

8. Locate catch basins and maintenance-hole covers away from vehicle wheels, to reduce vehicle-generated noise and vibrations.

7.3 Roadway

The roadway is the asphalt portion of the public right-of-way, including the median if one exists. The roadway is a conduit to move bicycles, cars, trucks, and buses. On some roads, this portion of the corridor also provides space for on-road parking. The roadway design should balance and support the needs of all users.

7.3.1 Cycling Lanes

On-road cycling routes can be provided either as a dedicated cycling lane, or as a wider shared curb lane.

1. Locate dedicated cycling lanes adjacent to the curb except where there are turning lanes, on-road parking or bus-only lanes.

2. Provide shared curb lanes (4 to 4.5m) as the cycling route on roads that have posted speeds of 60km/h or less, with many intersecting side-streets, and on-road parking, so that cyclists can mix relatively safely with vehicles.

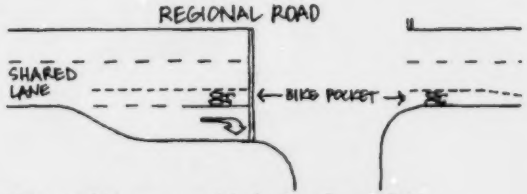
3. Provide dedicated cycling lanes on roads that have posted speeds of 60 km/h or more, with higher volumes, and greater spacing between intersections, to provide separation from higher speed vehicles.

4. Design dedicated cycling lanes to be 1.5 to 2.5m wide. A 1.5m lane width is acceptable where the ROW is limited. 2m wide lanes are typical, and 2.5m wide lanes can be used when traffic volumes and speeds are high and there are many trucks or buses. These measurements include a 0.25m offset when located adjacent to the curb.

5. Design the roadway's stormwater drainage to avoid the storage of water or snow on cycling routes.

6. Have regard for cycling requirements when locating catch basins and maintenance-hole covers. Use curb-face inlets as an alternative to catch basins.

7. Ensure that cycling lanes do not end abruptly at intersections or mid-block locations without providing continuity of cycling facilities. When cycling lanes need to end, do so on the far side of an intersection, and provide adequate tapers and sign notification.



Bike pockets are a safety feature for cyclists, especially where intersections have turning lanes.

Cycling lanes should be configured according to the function of the ROW.

Consider curb extensions or 'bump-outs' to define lengths of on-road parking.

On-road parking calms traffic and separates pedestrians from the road, contributing to a better street environment.

8. Consider the use of innovative cycling supportive/awareness measures such as "bike pockets"/bike slot lanes. These are spaces specifically for cyclists demarcated with painted lines to provide guidance to both the cyclists and motorists at the approach or departure from an intersection.

7.3.2 Transit

Ottawa-Carleton's public transit system depends on the safe and efficient movement of buses along most regional roads. The integration of bus movements with traffic flow is an important consideration.

1. Design the road to give buses equal or greater priority than other motorized vehicles. In specific corridors where volumes warrant, provide dedicated bus and/or high-occupancy vehicle (HOV) lanes. In most cases, however, buses will be operating in mixed traffic in the curb lane of regional roads.

2. Consider using bus bays only on roads with speed limits of 80km/h or greater, or where a site specific safety hazard has been identified.

7.3.3 Traffic Lanes

As regional roads generally function as high-volume traffic-movers, the number and width of traffic lanes is an important design question. This is especially challenging when the ROW is narrow yet many road components are to be included in the road edge.

1. Keep the number and width of travel lanes as few and narrow as possible, while considering safety and capacity requirements, to reduce the amount of asphalt, to reduce the width of cross-walks, and to dedicate as much of the ROW as possible to the road edge.

2. Design traffic lane widths based on the road design speed, traffic volume, number and type of trucks and buses and the available ROW. Higher-speed roads require wider lanes in the range of 3.5 to 3.75m. Lower-speed roads can have narrower lanes ranging from 3.25 to 3.5m.

3. In narrow ROWs such as on downtown roads, consider reducing lane width in favour of increasing the width for pedestrians, cyclists and trees.

4. Include a curb offset of 0.25m to provide space for drainage and wheel separation from the curb.

7.3.4 On-Road Parking

Some regional roads play an important role in providing parking for residents, visitors or customers of adjacent land uses. However, on-road parking consumes road capacity. It

can also create an obstacle to street sweeping and snow management.

1. Introduce on-road parking on roads with land uses that are directly accessible from the corridor and that have low posted speeds. This will calm traffic, separate pedestrians from traffic lanes, and promote road-oriented business activity.

2. Use parallel parking as opposed to diagonal parking, to maximize driver visibility and passenger safety, to calm traffic, and to make efficient use of the ROW.

3. Consider the use of curb extensions or "bump-outs" at crosswalks, and at certain locations to define lengths of full time on-road parking, to reduce the crosswalk distance. This will calm traffic and provide space for tree planting, street furniture, bus stops and/or bicycle parking.

4. Make curb lanes wider when shared between parallel cars and cyclists. Parking lanes should be 4.0 to 4.5m wide when doubling as a peak hour shared lane. Otherwise curb-side parking can be 2.5 to 2.75m wide.

5. Limit on-road parking to non-peak hours on certain roads where peak-hour vehicle capacity is required.

7.3.5 Medians

For roads with wider ROWs, there may be the potential for a median between opposing traffic lanes. Medians can also be used to define a special urban district, especially for main street or high density residential roads.

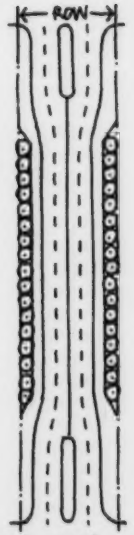
1. Limit the use of medians to reduce the road corridor width. Use medians as a traffic control measure after other measures are considered.

2. Consider medians on roads with higher posted speeds to divide opposing traffic lanes and reduce the risk of high speed collisions.

3. Construct medians along roads with numerous driveways to protect left turn lanes, to control traffic turning movements at specific locations, to provide pedestrian refuge at wide crossings, and to provide space for traffic signals and utility poles.

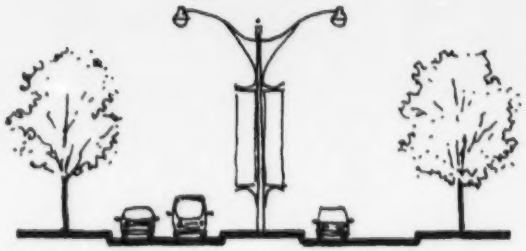
4. At intersections, design the median width to be 5m minimum, so that a 3.5m vehicle left-turn lane can be taken from the median while retaining a sufficient median width (1.5m) for pedestrian refuge, traffic signal infrastructure and signs.

5. On high-speed roads where left-turn lanes are required, consider using 5m wide medians only at those locations. Between intersections, use the extra

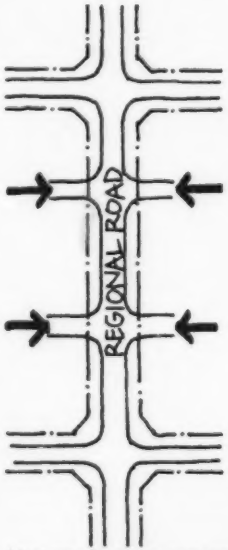


Use medians only where needed, and use the surplus lands for landscaping or pedestrian amenities.

On roads with low speed, medians provide opportunity for landscaping to delineate a special district or neighbourhood.



Lighting in the median provides effective coverage, reduces the number of poles required and reduces conflicts with trees.



Line up driveways across the road to facilitate safe cross-movements and to enable future signalization should the need arise

5m for landscaping the road edge or for additional pedestrian amenities.

6. Construct raised, curbed medians as opposed to mountable medians which are prone to uneven settling and can be expensive to maintain.

7. Consider landscaped medians for special districts or important roads. Medians can: accommodate road light poles, reduce the number of vehicle lanes during road retrofit projects, or spatially define wide road corridors. Plant trees on medians only on lower speed roads.

8. Select landscape materials for medians according to the guidelines for road edge landscape, and have particular regard for survivability, salt tolerance, and the need for consistency with landscaping on the road edge and on adjacent lands.

7.4 Intersections, Driveways, and Pedestrian Crossings

The design of intersections, driveways and pedestrian crosswalks is an important aspect of the road corridor. These are the places in corridors where all travel modes mix the most, where people have to make the most decisions regarding their direction and speed and where user safety is paramount.

7.4.1 Intersections and Turning Lanes

Road intersections include a combination of through-lanes, cycling lanes, turning lanes, and cross-walks. Movements may be controlled with overhead traffic signals or by road signs. The guidelines do not fully address the complexity of intersection design. Rather, the guidelines provide ideas that will help create intersections consistent with first principles outlined in Section 6.0.

1. Avoid dedicated right-turn deceleration lanes and double left-turn lanes wherever possible. Assess their need on a case-by-case basis, to improve pedestrian security, to reduce vehicle speeds, to reduce the pedestrian crossing distance, to improve visibility of merging drivers and create space for landscaping.

2. Avoid the use of lane channelization in areas with medium to high pedestrian or cyclist traffic. Assess the need for channelization on a case-by-case basis. Consider their effects on pedestrians and cyclists and their ability to safely control traffic.

4. Use the smallest practical curb radii for the predominant vehicle mix to reduce vehicle speeds and the pedestrian crossing distances. Consider emergency vehicle requirements.

5. Acquire additional ROW for turning lanes at intersections and driveways so that the road edge components are not compromised.

7.4.2 Driveways (Site Accesses)

Although vehicular access to individual sites is controlled along regional roads, driveways are permitted in many instances.

1. Reduce driveway width and turn radii to decrease conflicts with pedestrians. Ensure that driveways can accommodate the turning movements of trucks that require access to the site.

2. Consolidate driveway accesses to reduce the number of vehicular connections to regional roads.

3. Align driveway accesses on either side of the road to create a more familiar intersection pattern and to coordinate the location of median breaks and future intersections.

7.4.3 Pedestrian Crossings

Sidewalks along regional roads may cross intersecting regional roads, other public streets, and private driveways. These crossings may be signalized or not. The width of the crossing may range from as little as 3m (a one-lane private driveway) to greater than 30m (multiple lanes with a median). The variables in the crossing design include the vertical elevation of the sidewalk (continuous or depressed), the sidewalk cross-slope, the sidewalk surface material, and the curb treatment (i.e. continuous, returned or depressed).

1. Where a sidewalk along a regional road crosses an unsignalized private driveway, the regional road curb should be continuous but depressed along the crossing. The sidewalk should be depressed as little as possible. Grade transition should occur in the inner and outer boulevards where they exist. The sidewalk surface material should be continuous across the crossing. This design reinforces pedestrian priority and continuity of the road edge.

2. Where a sidewalk along a regional road crosses another regional road, public street, or signalized private driveway, the regional road curb should be returned to meet the curb of the intersecting street or driveway. The returning curb and crossing should be depressed to the elevation of the intersection. To announce the approaching safety risk to the pedestrian, the crossing surface material should be different from the sidewalk. This guideline also applies to other sidewalks that cross regional roads.

Special paving can be used to delineate the pedestrian crossing and the continuity of the sidewalk.

3. Where extra visual emphasis on pedestrian priority is desirable, or where traffic calming is being pursued, the pedestrian crossings may require alternative designs. In such instances, the pedestrian crossing may retain a surface elevation that is continuous with the sidewalk. The crossing surface may differ from both the roadway (or driveway) and sidewalk surfaces. The use of such designs may be reviewed on a case by case basis, taking into account emergency service vehicle needs, pedestrian and vehicle traffic volumes, and accident history at the crossing.

4. Sidewalk cross-slopes as well as the slope and surface transition at depressed curbs or crossings should be as gentle and barrier-free as possible.

5. Include safeguards such as detectable warning surfaces, directional textures, warning signs, audible signals, paint markings, and clear sight lines, where sidewalks or recreation paths cross intersections or driveways, so that cyclists and pedestrians of all ability are made aware of approaching crosswalks and their routes.

6. Consider using bollards or other separation devices at pedestrian crossings, in certain instances, such as on medians or islands within long pedestrian crossings, to increase the visibility of the crossing location and improve pedestrian safety.

7. Ensure that the direction of curb ramps at pedestrian crossings are oriented in the same direction as the crossing, so that visually impaired people are directed correctly.

8. Ensure that there are pedestrian signal phases at all signalized intersections. For intersections where pedestrian volumes are very low, pedestrian signal push-buttons could be considered.

9. Ensure that push-buttons for pedestrian signals are easily accessible and unobstructed for use by those with physical and/or visual impairments.

10. Factor in winter conditions and the ability of seniors and those with physical and/or visual challenges when establishing the timing phases of pedestrian crossing signals.

7.5 Linear Services and Road Operation

Regional road corridors accommodate a range of services and infrastructure such as road lighting, piped and cable services, storm water management systems, snow management requirements and trees. This infrastructure is located in various locations within the ROW.

7.5.1 Services and Utilities

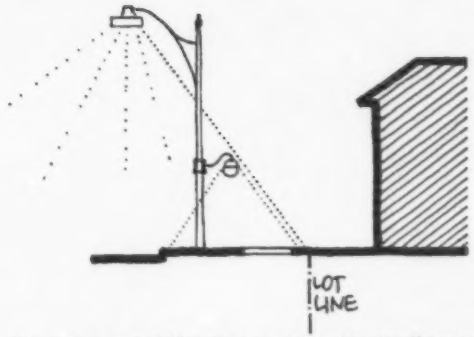
Regional roads host a range of municipal services such as piped water, sanitary sewers, and storm sewers, as well as utilities such as hydro, gas, and telecommunications (cable, telephone, data, etc.).

1. Bury services and utilities, where practical, to minimize their visual impact.
2. Maximize the shared-use of utility trenches to reduce ROW requirements.
3. Maximize the joint use of utility poles to minimize their number.
4. Coordinate landscape plans with service/utility plans, considering trees as a type of utility. Minimize long-term conflicts with tree roots and branches.
5. Minimize the visibility of utility accessories, i.e. utility boxes.
6. When widening roads or constructing or repairing utilities, use trenchless technologies to minimize damage to public infrastructure including trees, sidewalks and road pavement.

7.5.2 Lighting

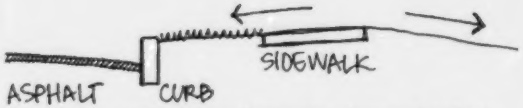
Roadside lighting is used to light both the roadway and the sidewalk. This ensures safe night time driving, cycling and pedestrian crossing and creates a safe and secure environment for pedestrians.

1. For roads that have high potential for pedestrian traffic, use shorter separate pedestrian-scale lights, to add to the visual character and pedestrian appeal of the streetscape.
2. Design the height of pedestrian lighting between 3m and 5m, either as stand-alone poles or as attachments to street light poles or buildings. The lights should not cause glare in motorists' eyes, or not conflict with traffic lights.
3. Share the use of poles for overhead utilities and lights, where possible.
4. Design light poles to accommodate banners, signs, flower baskets, electrical outlets and festival lighting, along main streets, downtown roads

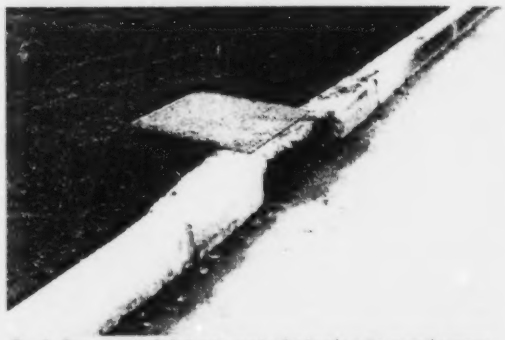


Use sharp cut-off lighting to reduce light spillover and flat lenses to reduce glare.

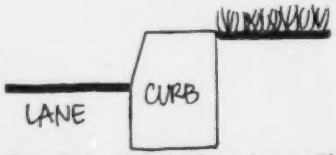
A street light pole can also accommodate pedestrian lighting, road signs and banners.



Design the road edge so that water does not collect on the sidewalk.



Curb-face type inlet are not obstacles to road users, especially cyclists.



Bevelled curb faces have longer life-spans and are cyclist friendly.

or important commercial/institutional roads.

5. Use sharp cut-off lighting such as flat lens luminaries to reduce glare and light spillover, where roads are adjacent to light-sensitive uses such as residences.

6. Encourage merchants to light up their windows in the evening to contribute to sidewalk illumination and make the street more secure and animated.

7. Use energy efficient road lights. Use 'white light' sources, especially in areas with high volumes of pedestrians to create a safe and natural colour spectrum.

8. Carefully design the transition of lighting intensity when approaching or leaving intersections to allow motorists eyes to adapt to changing light conditions.

9. Carefully assess lighting requirements along stretches of road that permit on-street parking to minimize the risk of collisions with parked cars, and to improve the visibility of pedestrians near parked cars.

10. When assessing lighting options, give priority to meeting performance standards over cost.

11. On higher speed roads, offset the light pole 1.5m or greater from the curb to reduce the risk of vehicles hitting the pole and to leave room for snow storage. On lower speed roads, 1 to 1.5m offset is acceptable (0.75m in constrained locations).

7.5.3 Drainage and Curbs

Rain and meltwater need to be effectively managed on the road corridor. The effective use of inlets, catch basins, grading and curbs will result in good drainage conditions.

1. Design the road edge so that surface water does not pool on the sidewalk, and so that melt-water does not run onto the sidewalk and freeze causing slippery conditions. Slope the sidewalk and inner boulevard towards the curb, while sloping the outer boulevard (if one exists) away from the sidewalk.

2. Depress grassed medians and boulevards slightly to collect stormwater and reduce runoff.

3. Use curb-face inlets, as opposed to traffic lane surface-mounted catch basins to reduce the amount of differential settlement, to eliminate on-road obstacles for cyclists and vehicles, to reduce noise and vibration and to reduce long term maintenance costs.

4. Bevel the curb face slightly away from the traffic lane to reduce the risk of chipping by paving or snow clearance equipment, and to benefit cyclists.

7.5.4 Snow Management

The operational requirement to manage snow that falls onto vehicle lanes, cycling lanes, sidewalks, and recreation paths needs to be incorporated into road design. Snow management operations need to be cost-effective and create safe conditions for road corridor users. This may affect decisions on landscape strip widths, median design, planting materials, and sidewalk locations.

1. When providing an inner boulevard, include a sufficiently wide (2 to 3m) and unobstructed space adjacent to the curb for snow storage and removal operations.

2. When a wide inner boulevard is not provided, align roadside trees, light poles, utility poles, and cluster street furniture such as transit facilities, parking meters, waste baskets, and phone booths, as much as possible, to facilitate snow management activities.

3. In areas with high pedestrian volumes and along transit routes, give sidewalks and pedestrian crossings equal priority to traffic lanes in terms of keeping them cleared of snow and ice.

4. Coordinate snow management operations where sidewalks are located at or near the curb, so that the sidewalk is not obstructed in favour of a cleared vehicle lane.

5. Avoid planting shrubs in snow storage areas, especially along turning lanes at intersections where the road edge has been narrowed.

6. Use vegetation rather than snow fencing to reduce snow drifting in open windswept areas, such as at the rural-urban transition zones. Consider planting coniferous trees or high shrubs outside the ROW.

Provide space at the curb for snow storage.

8.0 DEMONSTRATION PLANS AND SECTIONS

8.1 Road Types

Regional roads are very diverse. They vary in their function, width and land use context. It is necessary to provide demonstration plans that respond to different corridor types. The Region's background research on the performance evaluation of representative regional roads provides a thorough analysis of the characteristics that define different corridors within different urban contexts. Included is a review of indicators such as: number of vehicle lanes, block length, frequency of accesses, sidewalk and boulevard widths, civic context, adjacent land use, building setbacks, and building height.

Based on this analysis, and through an evaluation of several defining characteristics, six road corridor types have been developed as the basis for organizing the demonstration plans and sections:

1. Urban Core
2. Urban Residential
3. Urban Main Street
4. Suburban Commercial
5. Suburban Residential
6. Suburban Business/Institutional

Although these road corridor types form the basis of the demonstrations, it is not possible to encapsulate all of the various combinations of road corridor functions and contexts. There will be variations of these basic types. On this basis, the guidelines are presented in a manner that recognizes the need for flexibility in their implementation. It is important to note that the three "urban" road types may also be appropriate for suburban locations.

8.2 Right-of-Way Considerations

Ottawa-Carleton's ROW protection policies prescribe the width of the ROW that is sought for protection. This width ranges from a low of 20m for roads in the core area to a high of 45m for roads in suburban locations.

Municipalities may find that the available ROW is less than what is required to design a road which most effectively addresses the first principles for regional road design as outlined in Section 6.0. In such cases, creativity is required in the road design to fit in all of the desired road components. While trade-offs may be needed, these guidelines can help establish values and principles and point to solutions. In some cases alternative development standards may need to be used.

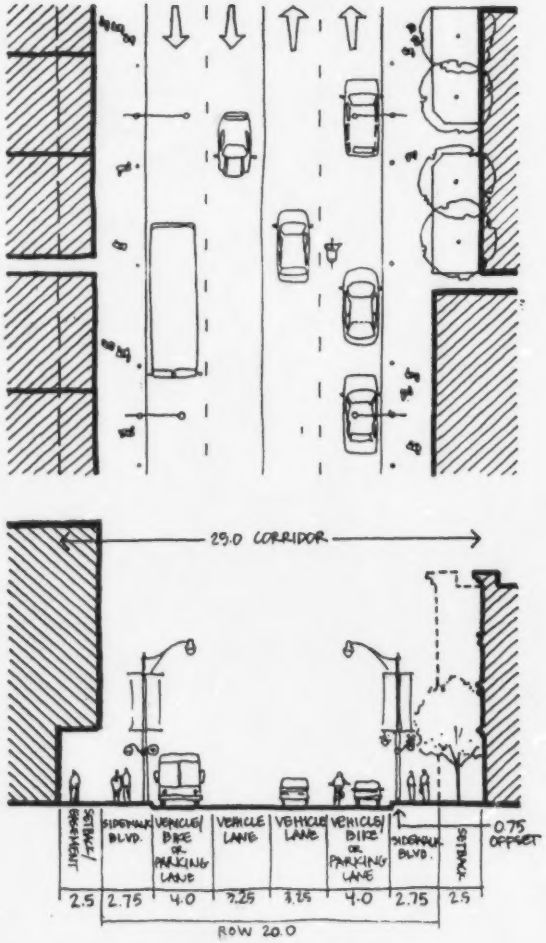
The following table lists various road corridor components and appropriate dimensions according to three circumstances. The first circumstance is an urban corridor where the available ROW is constrained. The second is an urban corridor where there are no ROW constraints. The third is suburban corridors where the ROW is typically unconstrained. This table provides guidance when designing road corridor cross-sections.

The following sections 8.3 to 8.8 provide plans and cross-sections for variations of the six road types. These variations are intended to be only a sample of the possible options.

Appropriate Dimensions for Road Corridor Components:

ROW Component	URBAN		SUBURBAN
	Constrained	Unconstrained	
Adjacent Lands/ Neighbourhood Components			
Building Height-to-Width Ratio	1:1 to 1:2	1:1 to 1:3	1:3 to 1:6
Building Setbacks	0m	0 - 6m	0 - 6m+
Road Edge Components			
Sidewalk	2.0m +	2 - 3.0m+	2.0m
Sidewalk Offset (from buildings)	0.25m	0.25 - 0.5m	0.5m
Streetlight/ Utility Post Curb Offset	0.75m	1.0 - 1.5m	1.5m+
Tree Offset from Curb	0.75m	0.75 - 1.5m	2.75m+
Inner Boulevard	N/A	2.0 - 3.0m	2.0m - 4.0m
Outer Boulevard	N/A	N/A	0 - 3.0m
Roadway Components			
Curb Offset (separating any lane from a curb face)	0 - 0.25m	0.25m	0.25m
Dedicated Cycling Lane*	N/A	1.5 - 2.0m	2 - 2.5m
Shared Curb Lane (shared cycling & vehicles, part-time or full-time vehicle parking)*	4.0 - 4.5m	4.25 - 4.5m	4.5
Curb-side Parking* (full-time vehicle parking, no cycling)	2.5m	2.75m	N/A
Vehicle Non-Curb Lanes (no parking, no cycling)	3.25m	3.25m	3.5m
Vehicle Curb Lane* (no parking, no cycling)	3.5m	3.5m	3.75m
Medians	N/A	0, 1.5, 5.0m	0, 1.5, 5.0m
Right-of-Way (ROW) Width	20m or less	23, 26, 30m	30, 34, 37.5, 44.5m
Corridor Width	20.5m or less	26 - 32m	34 - 50m+

*Note: 0.25m curb offset is included.



The creative use of building setbacks and overhangs, outside of the ROW, can provide more space for pedestrians and trees.

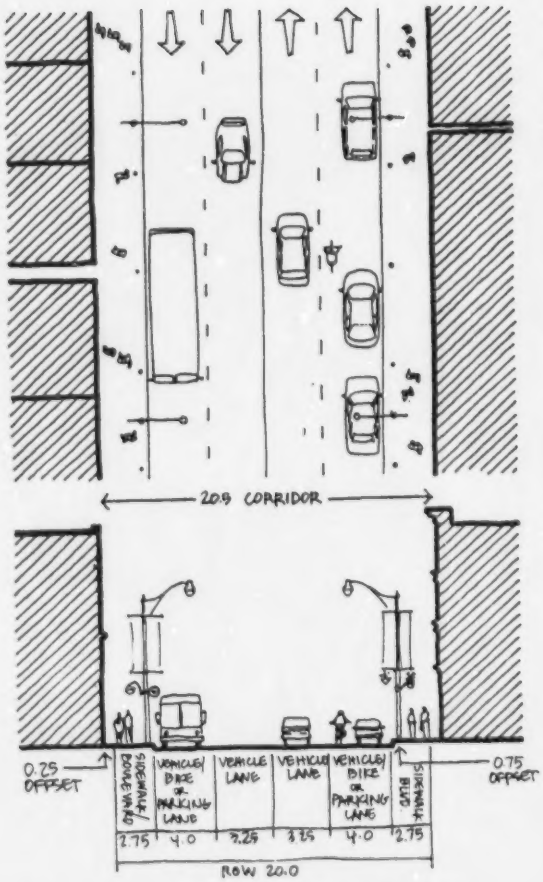
8.3 Urban Core

These roads have historically narrow ROWs and are found in denser urban areas such as the Central Area. They are often flanked by mid-rise and high-rise buildings, with minimal building setbacks and a mix of uses. The building height-to-corridor width ratio is often 1:1 or 1:2. There is usually both on-street and off-street parking. There is a high potential for traffic of all modes.

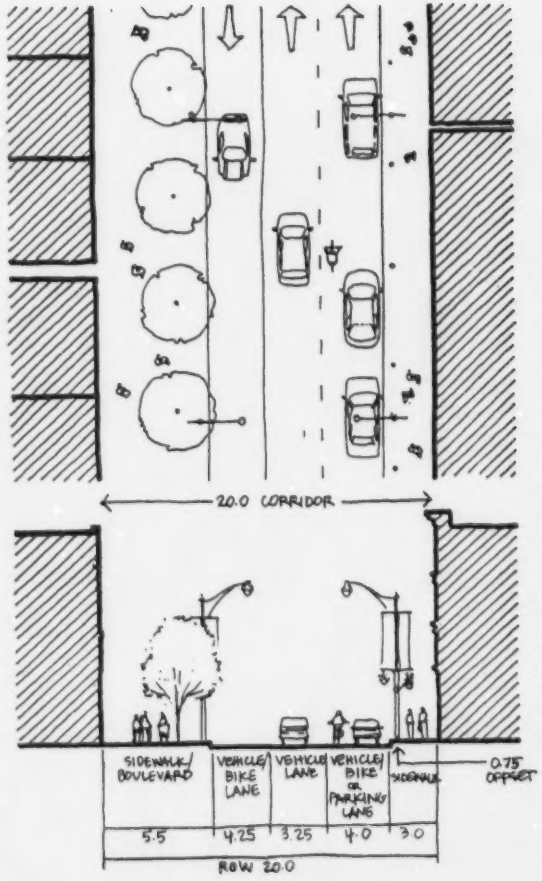
The ROW is typically 20m, with a 20.5-26m corridor accommodating all components. Under the current Regional Official Plan, there is the potential to secure an additional 4m high by 1.5m wide pedestrian easement from adjacent lands, where cantilevered buildings overhang the easement. If the overhang is supported by columns, the easement may be 2.5m plus the width of the columns

Where existing urban core roads are being retrofitted, the intent of redesign is to better distribute the space among the road functions, maximizing pedestrian comfort on the sidewalk and cyclist safety. Road corridors could be improved by:

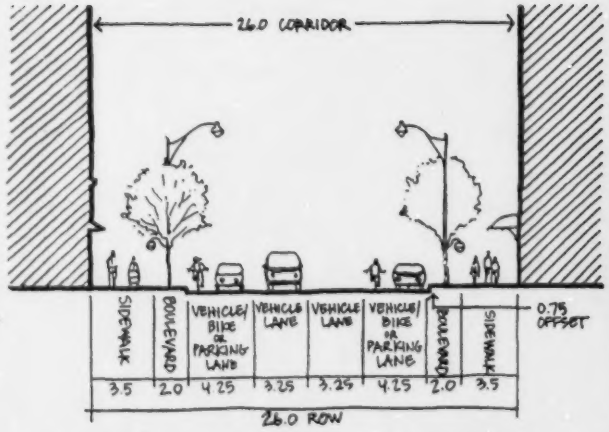
- providing trees and vegetation in raised planting beds along the curb in-lieu of wider sidewalks;
- locating trees on adjacent lands;
- adding pedestrian level lighting;
- using curb lanes either as a shared vehicle-bike lane, or a parking lane, or both, depending on peak-hour requirements;
- deleting a parking lane on one side of the street to create wider sidewalks; and,
- using additional ROW if available, to create (in order of priority): wider sidewalks, more cycling space and street trees.



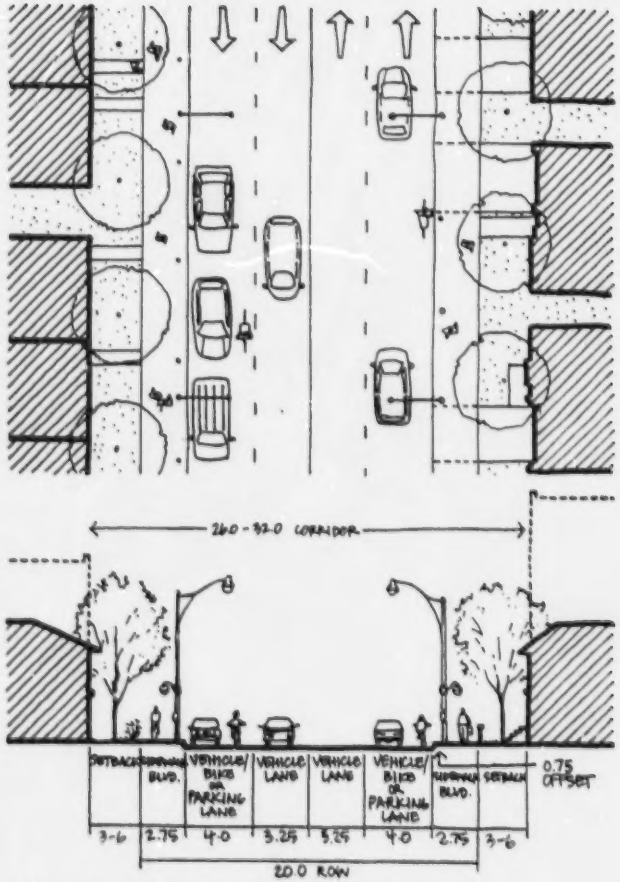
All users can be accommodated in a 20m ROW, although the space is constrained. An additional 0.25m is required to create a 3.0m sidewalk.



Deleting one vehicle lane will free up ROW for a wider sidewalk and trees, preferably on the sunny side of the corridor.



A 26m ROW provides space for wider sidewalks and cycling facilities, as well as a planting zone along the curb.



A 20m ROW provides adequate space for all road components, provided that landscaping be accommodated on adjacent lands.

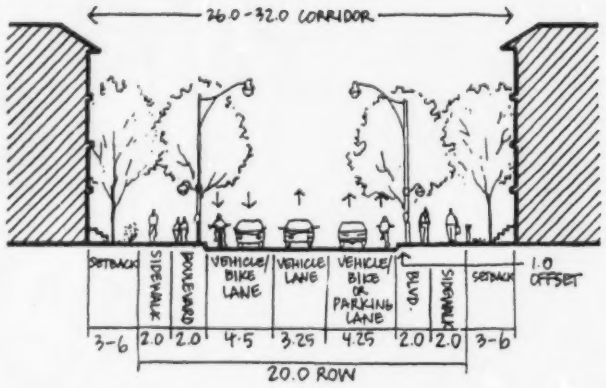
8.4 Urban Residential

These roads generally have historically narrow ROWs and are found in denser urban areas. They are lined primarily with houses and mid-rise apartments and some small to mid-size mixed use buildings. There could be individual driveways and/or shared on site parking. The building height-to-corridor width ratio is typically 1:3, resulting in well-defined road corridors. There is usually limited on-street parking. There is a high potential for all modes of traffic.

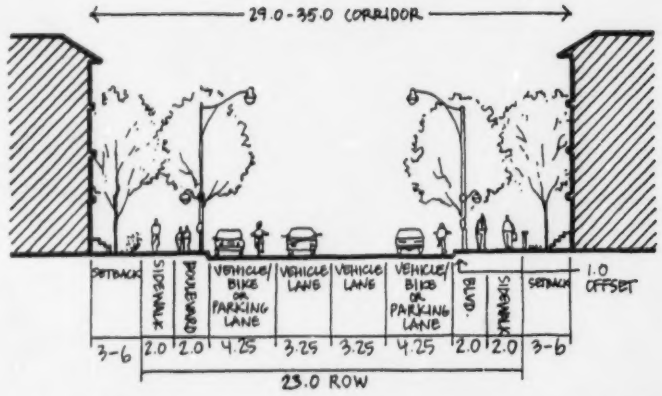
The ROW is typically 20m (protected), but 26m better accommodates all components. The corridor width ranges from 26 to 38 m.

Where existing urban residential roads are being retrcfitted, or new roads are planned consider using:

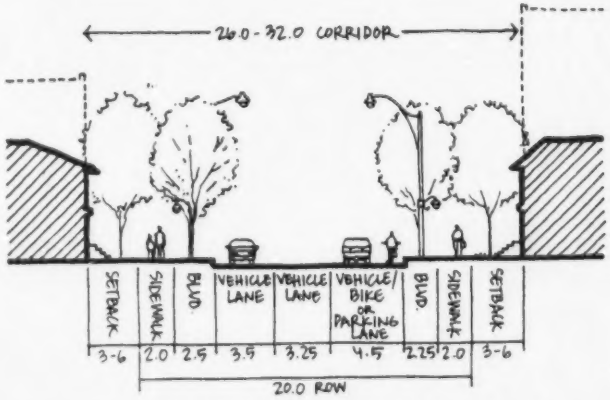
- pedestrian level lighting;
- curb lanes as either a shared vehicle-bike lane, or a parking lane, or both depending on peak-hour requirements;
- the parking lane on one side of the street to create wider sidewalks or introduce trees;
- additional ROW, if available, to create (in order of priority): wider sidewalks, more cycling space, and space for street trees.



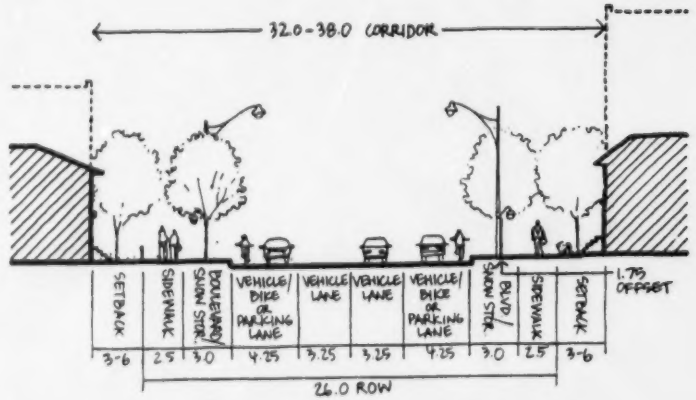
Deleting one vehicle lane will provide more space within a 20m ROW for curb-side planting. This could be substituted for wider sidewalks.



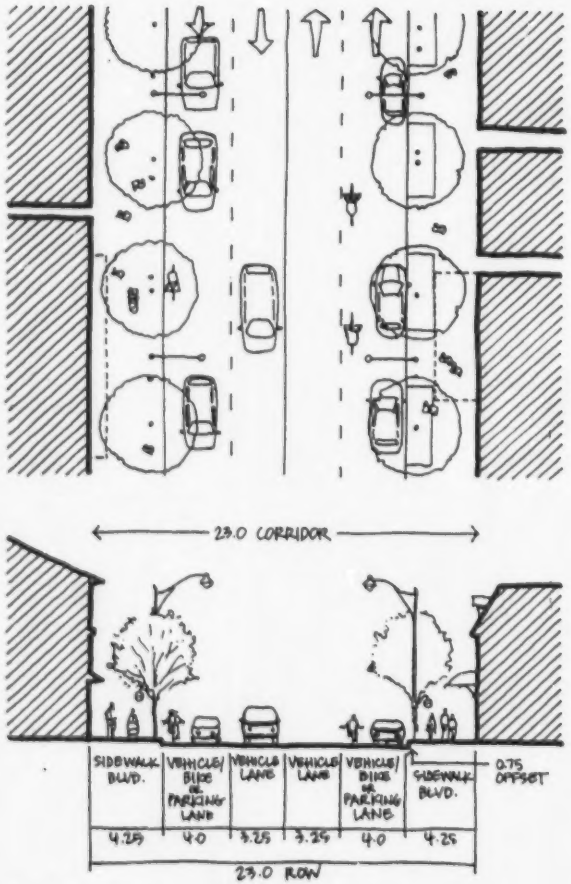
A 23m ROW provides space for curb-side landscaping and wider shared curb lanes.



Three-lane, one-way streets result in wider sidewalks and tree-lined inner boulevards within a 20m ROW.



A 26m ROW will accommodate all users comfortably.



Buildings located with zero setback adjacent to wide sidewalks and overhanging trees will result in good public spaces.

8.5 Urban Main Street

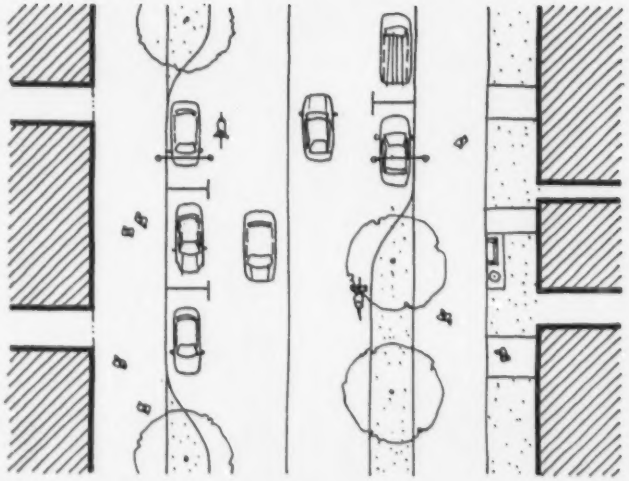
These roads generally have historically narrow ROWs and are usually found in denser urban or village areas with a mix of at-grade retail and residential uses in a continuous edge of closely set, low and mid-rise buildings with individual street entrances. There is both on and off-road parking. There is a high potential for traffic of all modes.

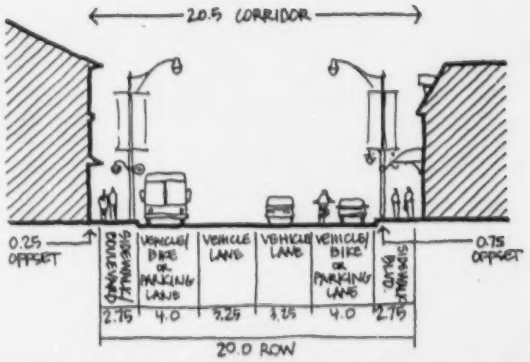
Roads with this cross-section are also found in village cores, exhibiting many of the same characteristics, however, usually having lower densities and lower traffic volumes.

The ROW is typically 23m (protected), but 26m accommodates all road components more appropriately. The corridor ranges from 23 to 26m in width.

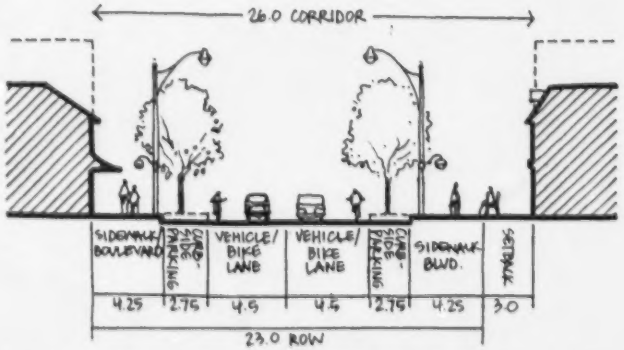
When retrofitting an urban main street or planning a new one, consider using:

- raised planting beds along the curb in-lieu of wider sidewalks;
- curb lane "bump-outs" or landscaping and bike parking and for defining street parking areas;
- pedestrian level lighting;
- curb lanes as either a shared vehicle-bike lane, or a parking lane, or both depending on peak-hour requirements;
- parking lane on one side of the street to create wider sidewalks; and,
- additional ROW, if available, use to create (in order of priority): wider sidewalks, more cycling space and space for street trees.

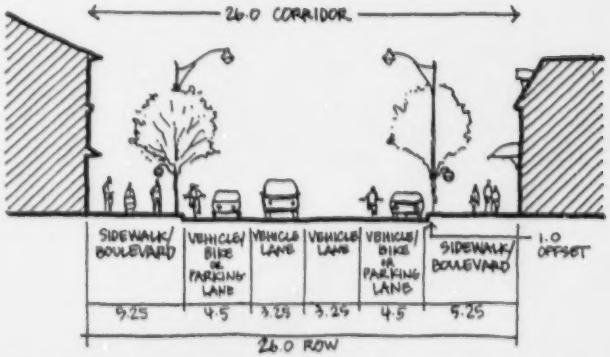




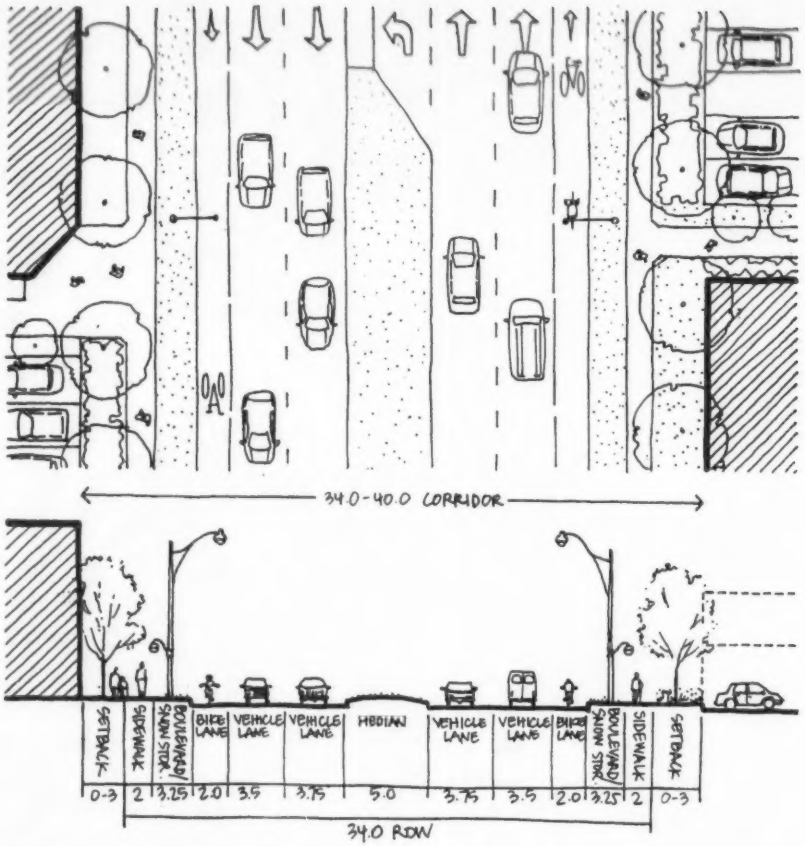
Where the ROW is constrained, and road user capacity is high, there is no space for landscaping or snow storage.



Deleting vehicle lanes in favour of tree islands, shared cycling lanes, and permanent on-road parking will narrow the roadway and allow for wide, unobstructed sidewalks. This design is appropriate for both urban and village settings.



A 26m ROW will provide space for trees, generous sidewalks and space for short term snow storage.



Landscaping can be provided on adjacent lands so that this design can fit within a 34m ROW.

8.6 Suburban Commercial

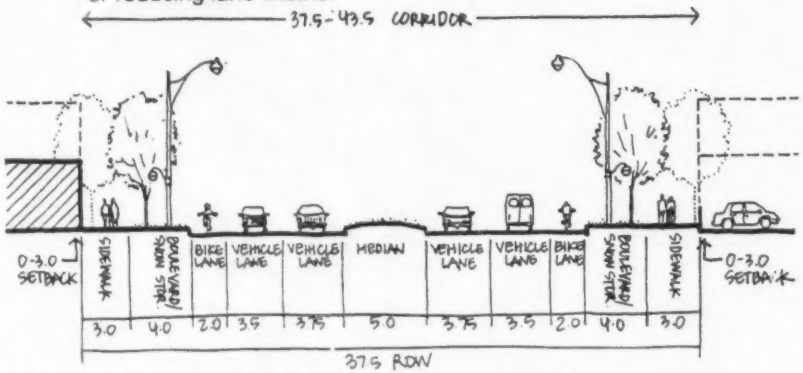
These roads generally have wide ROWs with four to six lanes, serving commercial retail and service businesses in low-rise and mid-rise buildings. Traditionally there has been extensive road side parking areas, often with very little landscape treatment and an unappealing pedestrian environment. Vehicle traffic levels are high, and there is potential for moderate bicycle and pedestrian volumes.

The ROW is typically 37.5m if two bike lanes are included with four vehicle lanes and a median. The Regional Official Plan protects for 34m. A 44.5m ROW is required if two bike lanes are included with six vehicle lanes and a median, whereas the Regional Official Plan typically protects 40m, and occasionally 45m. Corridors range from 37.5 to 43.5m in width.

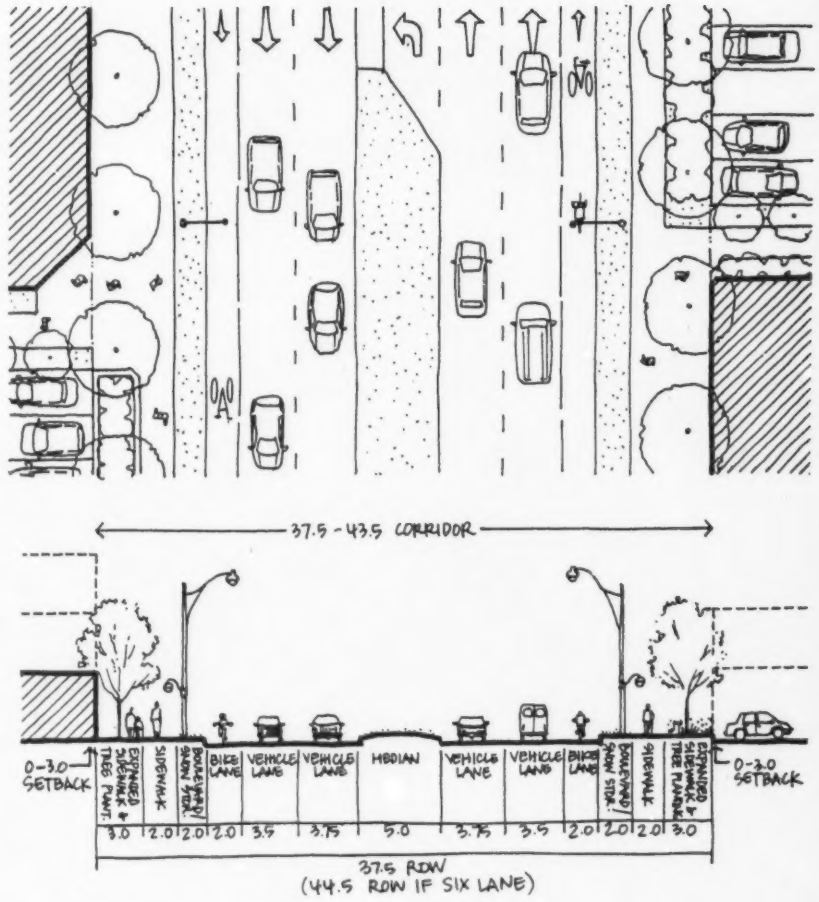
Demonstration Plans and Sections

When retrofitting suburban commercial corridors consider:

- infilling parking lots with buildings;
- planting trees between the sidewalk and curb;
- planting on adjacent lands;
- street lights located in outer boulevard, or on the median along long uninterrupted road lengths;
- pedestrian level lighting;
- shared bicycle/vehicle lanes when road speeds are less than 60km/h;
- replacing the median with narrow centre turn lane;
- reducing the outer boulevard to 2.0m or reducing lane widths.



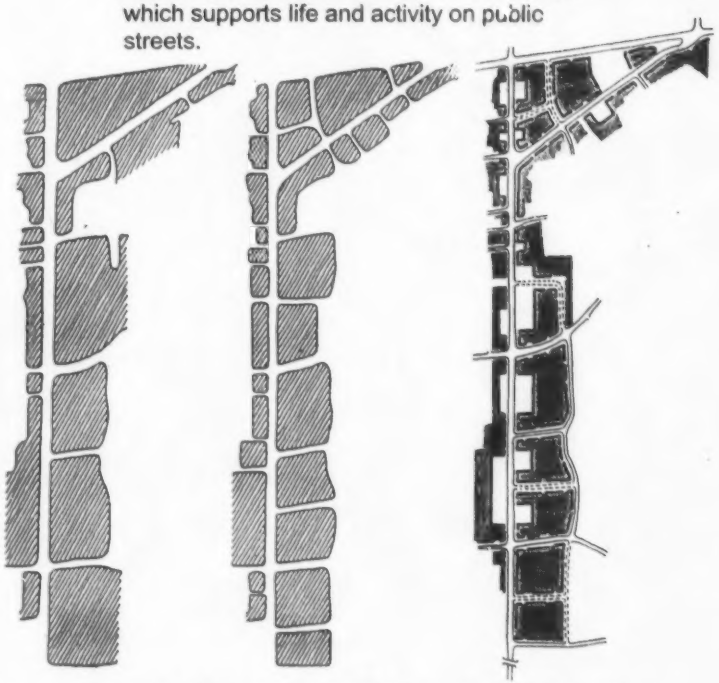
A 4m wide inner boulevard will provide for adequate setback (2.75m) for curb-side trees, which will help define the roadway space and separate pedestrians from traffic.



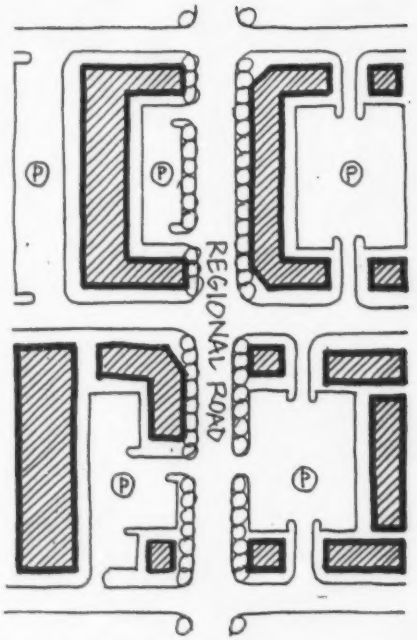
A 37.5m ROW provides space for four vehicle lanes and two dedicated bike lanes, as well as inner and outer landscape boulevards and a 5m median.

Demonstration Plans and Sections

The challenge of retrofitting suburban commercial corridors is to set the stage for new development patterns while still maintaining what are often highly successful retail centres. Reurbanization of these corridors depends primarily on enhancing streetscape quality, integrating the corridors with adjacent residential neighbourhoods and achieving a built form pattern which enables the evolution of a mixed use district which supports life and activity on public streets.



The reurbanization of suburban commercial roads depends in part on creating a smaller block structure and more street connections. (Merivale Road Urban Design Guidelines, City of Nepean, The Planning Partnership, duToit Allsopp Hillier, and Delcan Corporation)

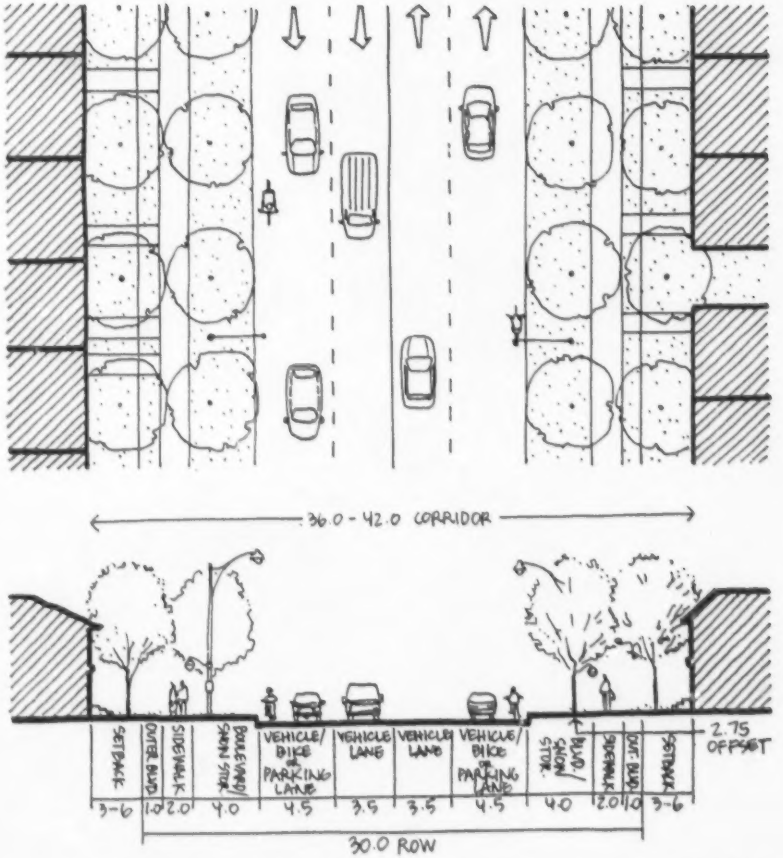


A variety of building configurations can achieve spatial definition along the regional road as well as defining 'courts.' Building corners can be given special treatment.

8.7 Suburban Residential

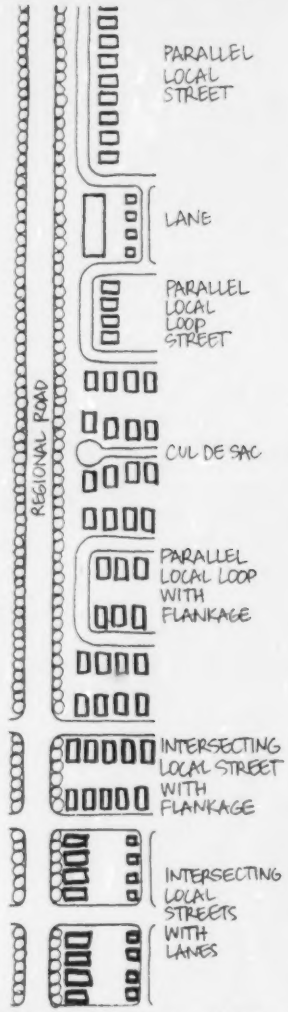
These roads generally have wide ROWs with four to six lanes, and are flanked by low density residences usually without direct vehicular access to the road. On-road parking is usually prohibited. Vehicle traffic levels are high, and there is potential for moderate bicycle and pedestrian volumes. Vehicle speed reduction is a design objective for these road corridors. Ideally, higher density residential uses should be considered along such regional roads to create special "urban" districts. With front facing uses, the road will function as an integrator not a divider.

The road components can fit within a 30 or 34m ROW. The required ROW is 37.5m if two bicycle lanes are included with four vehicle lanes and a wide median, whereas the Regional Official Plan protects 34m. A ROW of 44.5m is required if two bicycle lanes are included with six vehicle lanes, whereas the Regional Official Plan protects 40m and occasionally 45m. The corridor width ranges from 36 to 49.5m.



Where medians are not required, such as where speeds are slower, left-turns are infrequent, or where there is a grid of frequent intersections, a 30m ROW can accommodate all road users.

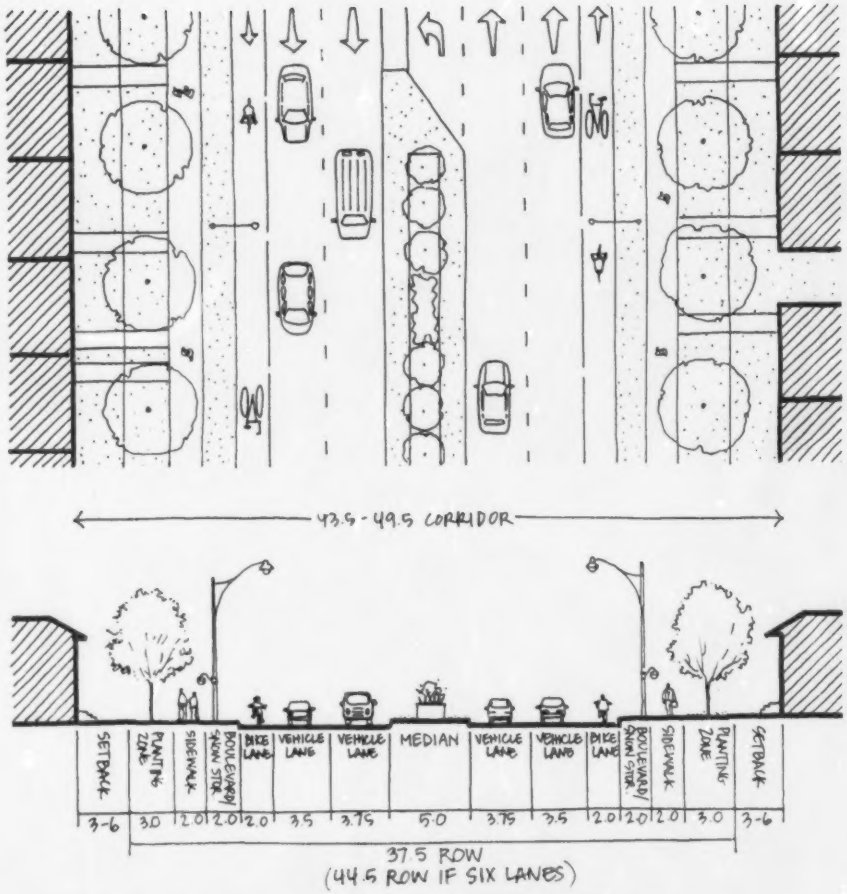
Demonstration Plans and Sections



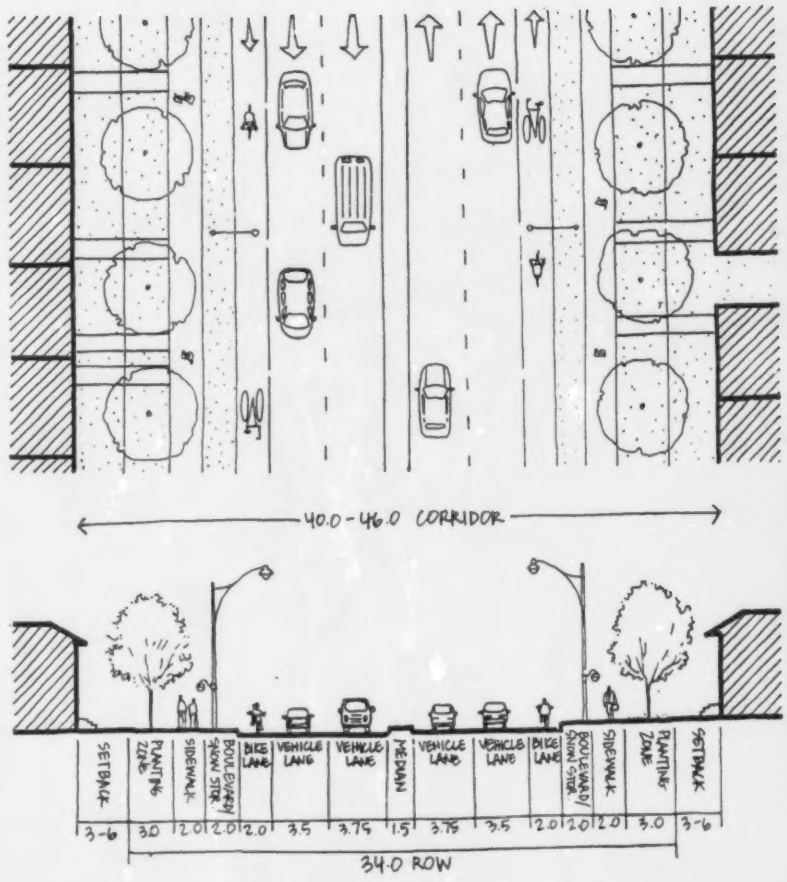
Optional neighbourhood design concepts can be used to avoid reverse frontage adacent to regional roads.

In retrofitting suburban residential roads or planning new residential neighbourhoods along regional roads, first consider optional neighbourhood design concepts that avoid reverse frontage. Also consider:

- planting in raised planters, including on medians in selected corridors;
- planting trees between the curb and the sidewalk;
- planting on adjacent lands;
- locating the sidewalk 1 to 2m inside the lot line, leaving wider inner boulevard;
- street lights located in outer boulevard, or on median along long uninterrupted road lengths;
- pedestrian level lighting;
- shared bicycle/vehicle lane when road speeds are less than 60 km/h; and,
- reduce the outer boulevard to 2.0m, or reducing the lane widths if there is insufficient ROW.

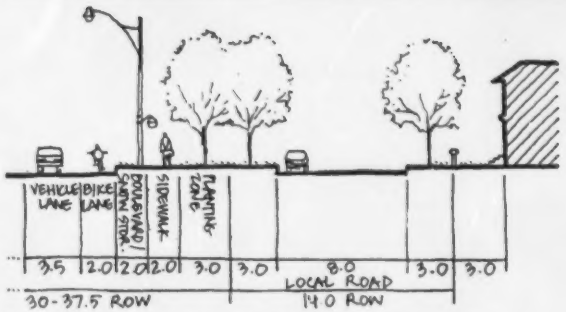


Where medians are required for left-turn lanes, a 37.5m ROW is necessary to accommodate road users including dedicated bike lanes. Planting in the median in raised boxes can accent special areas.

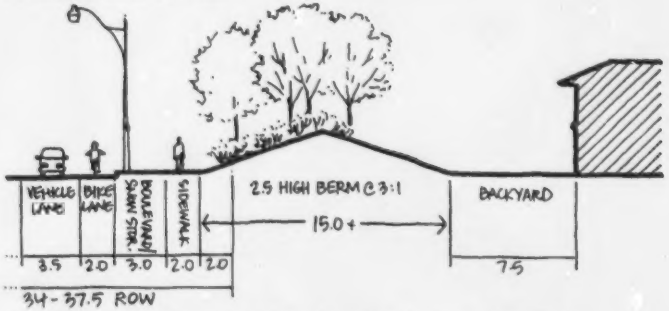


Two dedicated bike lanes and four vehicle lanes, along with a 7m road edge, can be accommodated in a 34m ROW, although a 1.5m concrete median provides no space for left-turn lanes.

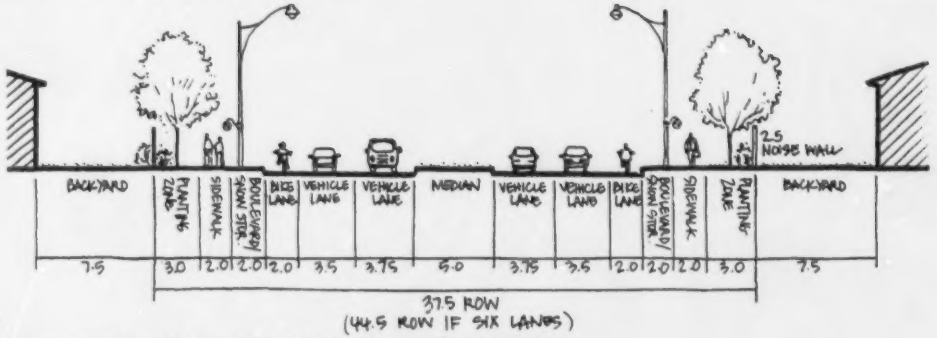
Demonstration Plans and Sections



A parallel local road can be designed with alternative development standards.



A wide, high berm can substitute for noise fences when noise attenuation is required and space is available.



Noise walls should only be considered in retrofit situations.

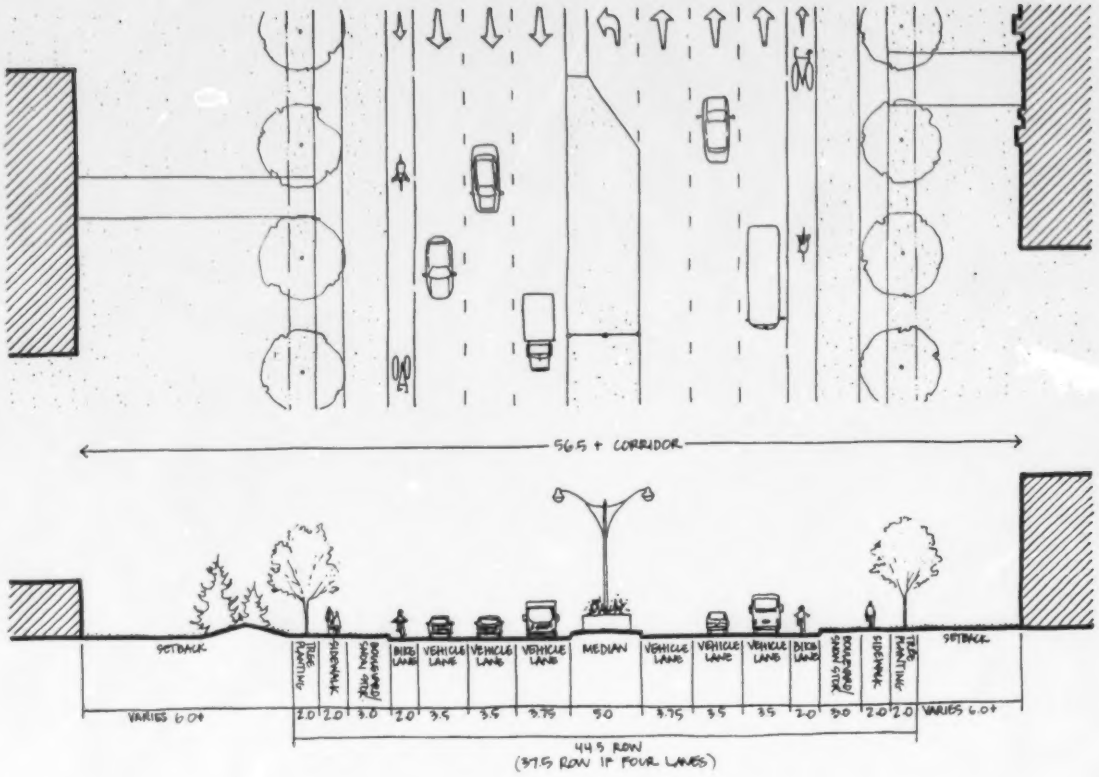
8.8 Suburban Business/Institutional

These roads generally have wide ROWs with four to six lanes and no on-road parking. They are flanked by commercial, industrial or institutional uses which are typically set back from the road in open landscaped sites, with limited direct vehicle access and no on-road parking. The building height-to-corridor width ratio is low. Road side landscaping can help define the road edges.
Traffic volumes are high and there is potential for low to moderate bike and pedestrian volumes.

The ROW is typically 37.5m with two bicycle lanes and four vehicle lanes, whereas the ROP protects 34m. The ROW is 44.5m with two bicycle lanes and six vehicle lanes, whereas ROP protects 40m and occasionally 45m. The corridor width varies depending on the setbacks.

In retrofitting suburban business/institutional corridors consider:

- planting in raised planter boxes on median;
- planting outside of ROW;
- street lights located in outer boulevard;
- pedestrian level lighting;
- reducing the planting zone to 2m, or reduce lane widths if there is insufficient ROW.



9.0 IMPLEMENTATION TOOLS

One of the two objectives of these guidelines is to identify means to implement them. Some of the implementation tools discussed include: establishing a community vision for specific road corridors, official plans, secondary plans, environmental assessments, zoning by-laws, site plan controls, subdivision plans, and sign by-laws.

9.1 Establishing a Community Vision for the Road Corridor

The measure and memorability of a city is given as much by the character of its streets as by its buildings and public spaces. In fact, since about a third of the land use of any city is in its streets, and since these corridors are in public ownership, the design of a street network in a city represents one of the most promising opportunities both to control and visually impact city residents and visitors alike.

These guidelines demonstrate that regional roads can perform a variety of functions and can take on many different forms. As outlined in Section 8.0, there are several types of regional road corridors and many variations of each. In some cases, such as in road retrofit situations or as part of secondary planning or neighborhood studies, there may be an opportunity to change the character of a road corridor. As such, many regional road projects need to be designed on a case-by-case basis.

Similarly, there can be several competing objectives, some relating to the aesthetic context and others relating to the functional aspects of the corridor. This is evident in the First Principles outlined in Section 6.0. Some principles promote regional road corridors as attractive, livable public spaces, while others recognize their relatively high speed function. However, all regional road corridors should aspire to integrate communities rather than divide them.

On this basis, it is clear that designers should formulate their plans based on a broadly accepted "vision" for the corridor. A vision is a collection of statements and/or images that express the desired character, form, and function for a road corridor. Developing this vision should be the first step in road corridor planning. Ideally, the vision should be developed with input of stakeholders including the adjacent community, business groups, landowners, plan review agencies, and special interest groups.

The visioning process for regional road corridors can include several steps:

- Identifying a road design or corridor planning project;
- Identifying the stakeholders;

- Examining existing and planned future conditions;
- Communicating with stakeholders to determine their desires, fears, values and aspirations for the road corridor;
- Developing and evaluating general design alternatives;
- Holding meetings, workshops, focus groups, and/or conducting surveys;
- Preparing a draft vision and circulating it widely for input; and,
- Finalizing the vision and seeking endorsement and/or approval.

The visioning process can be conducted for road design projects of all sizes, even small-scale projects such as intersection designs. Ideally, however, a vision should be established for entire corridors. This will avoid a piecemeal approach and will prevent a number of isolated and possibly conflicting visions along a corridor.

There are many benefits of doing a road design or corridor planning process with a clearly articulated vision. The most obvious is that there can be buy-in for the project from many stakeholders. The vision expresses community values and becomes an important basis for the development of a roadway design as discussed in the Geometric Design Guide for Canadian Roads (Transportation Association of Canada, September 1999). The vision will guide decisions over time even though politicians and staff may change.

9.2 Public and Private Sector Roles

In dealing with issues related to road corridor planning and design, the onus rests primarily on the public sector. The road ROWs are within the public realm and it is the role of the government agencies who own and administer these corridors to ensure that they are planned, designed and built to reflect these design guidelines.

The role of the various regional/municipal departments that have jurisdiction within these ROWs is to work toward an appropriate balance between the functional and aesthetic requirements of the community. Both are important to the ability of the city to work from a transportation perspective and the establishment of an appropriate image of the city that makes it a great place to live, work and visit.

It is also the role of the regional/municipal governments to establish policy and regulations that guide the development on adjacent lands that best complements the roadway and road edge.

The role of the private sector is primarily related to development that defines the corridor along the road ROWs. Adjacent development is crucial to the quality of the

urban image of the corridors. These Design Guidelines are intended to assist with a comprehensive approach to community design that will result in appropriate development, likely to occur incrementally over a relatively long period of time.

9.3 Planning Toolkit

In Ontario there is legislative authority for municipalities to control the planning and design of communities (the Planning Act). Within the Planning Act, tools (and associated approval processes) help determine the level of detail and the appropriate level of control that can be exercised. In addition to the Planning Act, other control avenues may be explored, including the Municipal Act and the Environmental Assessment Act. The following planning tools can be used to implement these design guidelines:

Official Plans - The Official Plan is intended to provide the most general guidance to the long-term development of a municipality. Statements are intended to be strategic and general. Community design policies in the Official Plan are broadly defined to establish the general vision, yet permit sufficient variation and innovation within the broader context, without the need for site specific amendments.

First Principles for road corridor design can be formalized in Official Plans. These principles can be introduced in the basis and objectives section of the Official Plan. Visions for individual road corridors can best be formalized as part of Secondary Plans or special area studies leading to Official Plan amendments.

On the basis of this review of design guidelines for regional road corridors, it is recommended that ROW protection requirements outlined in the Regional/Municipal Official Plans be reviewed to determine whether they are appropriate. It is not suggested that existing ROWs with long-established edges should be modified.

Secondary Plans – Secondary Plan policies are also broadly based and are intended to provide general guidance in the preparation of more detailed regulations for the preparation of Draft Plans of Subdivision, Zoning By-laws, Subdivision Agreements and Site Plan Control.

It is essential that Design Guidelines, especially ones that relate to road corridors within Draft Plans of Subdivision, be developed and included within Secondary Plans. It is often far too late in the process to require design criteria to be implemented in zoning or site plan approval if the Draft Plan, which may already be fundamentally flawed, has been approved. To avoid this problem, community design issues dealt with in the Secondary Plan are relatively detailed as they relate to community structure, land use pattern and road networks. Policies should be written to

identify items that will be essential, encouraged and/or discouraged. Wording must still be general enough to permit sufficient variation and innovation within the broader context, without the need for further amendments over time.

The Secondary Plan should also identify items such as permission and encouragement for alternative development standards, a description of the form of the road pattern, and should describe the 'vision' for regional roads. Secondary Plans can be adopted by Official Plan Amendment, following a thorough community involvement process.

Zoning By-laws - Items related to the Zoning By-law are intended to more clearly identify the land use distribution and the detailed regulations that will determine building types and the location of a building on a lot. Setbacks, building height, parking requirements and lot dimensions are typical items articulated in a Zoning By-law.

To implement the First Principles outlined in this guide, consideration should be given to reviewing Zoning By-Laws to:

1. Include front yard setbacks, or build-to lines, for all non-residential uses adjacent to regional roads, to ensure an appropriate building height-to-corridor width ratio to spatially define the road corridor.
2. Establish appropriate building heights for all uses along regional roads, according to the land use context, encouraging multi-storey buildings to improve the building height-to-corridor width ratio.
3. Permit mixed-uses along regional road corridors.
4. Encourage buildings and entrances to front, face and feature the road.
5. Where parking areas abut regional roads, require the parking area to be separated from the street by a landscaped edge, including vegetation, berms, and/or low fences. Allow breaks in the fence for site access.
6. Reduce the amount of required parking for all uses to encourage walking, cycling, and transit use.
7. Permit the shared use of parking between adjacent uses, particularly uses with offsetting peak hour parking usage, especially in the vicinity of transit stations.
8. Establish lot sizes and lot frontages appropriate to the desired land use context.

Draft Plans of Subdivision – Subdivision approval is a tool to divide large blocks of land into smaller parcels, including road corridors. Draft Plans should be created in consideration of these guidelines to ensure that regional roads do not become community dividers, but become fully integrated with the community as a focal point for commercial and mixed use activities. Further, Draft Plans should ensure that development lots have frontage along, and potential access to the road corridor.

Site Plan Control - The majority of urban development on private lands in built-up areas is approved by Site Plan Control. This planning tool should be used by development approval officers to implement the established 'visions' for road corridors and the specific design guidelines identified in this document. Measures recommended for implementation through the site plan control process include:

1. Develop an *Applicant's Guide* for Site Plan applications, and include examples of recommended design solutions. In the guide, reference the *Regional Road Design Guidelines*, relevant Official Plan policies and zoning regulations and other applicable regional regulatory codes. Request applicants to have regard for the guidelines.
2. Ensure that applications for Site Plan approval are accompanied by building elevations, sign details, landscape plans, grading and drainage plans, and composite utility plans so that all elements of the road corridor can be examined in a comprehensive manner.
3. Require that Site Plans are drawn on a base plan that shows the location of the regional road centerline, lanes, curb and all of the landscape features or utilities located between the curb and the street lot line. This will also permit a comprehensive review of the development as it relates to the road edge and roadway.

Sign By-Laws - As outlined in Sections 7.1.5 and 7.2.5, private and public signage influence the character of a street. Sign By-Laws should be reviewed to incorporate these guidelines. Sign By-Laws, as established pursuant to the Municipal Act, should recognize that performance standards related to permitted sign types, heights, and sign face areas should vary depending on the context and desired road character. The general road types outlined in Section 8.0 can be used as a framework for establishing standards.

Proposals for on-site signs for new projects should be included on all applications for Site Plan Control. To ensure that sign proposals are considered in the context of the Site Plan and the road corridor:

1. Encourage that a complete application for Site Plan Control include details on proposed signs. Include dimensions for sign height, width, and sign face area for each sign.

2. Establish approval mechanisms so that signs may be permitted to vary from certain provisions of the sign by-law provided that the signs are approved as part of the Site Plan Control approval process.

3. Where sign applications are submitted as part of an application for Site Plan Control, give the authority for signage approval to the Site Plan Control approval body. Building officials will be consulted on matters pertaining to sign structure or mounting devices.

Environmental Assessment - The Environmental Assessment (EA) process can provide another means for determining and formalizing visions for road corridors, especially for larger projects. In Ontario, larger road projects are required to undergo an EA study process. This often involves a thorough planning process with mandatory consultation. Phases 1 and 2 of the EA process require an examination of the need and justification for a project such as a road widening or a new road. Phase 3 requires an examination of alternatives and preliminary assessment of environmental effects. It is within these first three EA phases that a visioning process can be used to help define the desired road character, and to guide the development of the alternatives.

Where possible, the Official Plan, Secondary Plan and Environmental Assessment processes should be harmonized and carried out as one seamless planning exercise. This will streamline approvals, reduce confusion, and ensure that a wide range of planning interests can be addressed.

Regional Regulatory Code and Other Regulations - As outlined in Appendix A, there are various policies, regulations, guidelines and standards to apply to the design of regional road corridors in Ottawa-Carleton and other municipalities. The documents refer to many design issues ranging from noise, lighting, geometry, and construction details. The Design Guidelines are not intended to replace these documents. Rather, the guidelines are intended to be read in conjunction with them and possibly influence their modification when they are reviewed in the future.

9.4 Financial/Capital Planning Considerations

Many of the design guidelines identified herein may lead to a higher level of service. This ranges from wider sidewalks to more frequent tree planting, and these increased standards may result in higher construction and maintenance costs. In some cases,

however, the design may result in savings, such as where less land is required for ROW's or where lane widths are minimized. The cost savings or benefits may be accrued to the municipality or adjacent land developers, and this varies depending on the situation. Design related decisions should have regard for these cost implications on a case by case basis.

As a principle, good design should have regard for minimizing life-cycle costs. These are the costs of constructing, operating, maintaining, and replacing infrastructure over its life span, measured as an annualized cost. In some cases, a design may be more expensive to construct, but this cost may be offset by a longer life span or by lower ongoing maintenance costs. Today, there is a shortage of public funds relative to the list of required/desired road projects across the community. With this comes a requirement to "do more with less." Life-cycle costing should be considered by designers, stakeholders, and decision-makers.

9.5 Next Steps - Securing Buy-in

The success of the implementation of these guidelines will be a function of how they are understood and embraced by the intended users as outlined in Section 3.0.

Even though the document was created as part of an open and consultative process involving many stakeholders, it is acknowledged that its value will not be fully realized until it is applied in projects. The following initiatives can help ensure buy-in:

1. Wide distribution of the document to municipal staff, utilities, stakeholders and potential end-users.

2. Organization of workshops where municipal and consulting engineers, planners, landscape architects, and development approval officers will be introduced to the guide.

3. Meetings with key groups representing land development and community interests.

4. Recognition of the guidelines in various planning documents, and in an *Applicants' Guide* to Site Plan Control.

5. Review of Official Plan ROW protection policies.

6. Ongoing review and amendment of the guidelines, based on continuous monitoring and feedback.

With these measures, this document will be useful, both initially and over the long-term.

10.0 CONCLUSION

This study concludes that the best design of Ottawa-Carleton's regional road corridors involves balancing the needs of the corridor to function simultaneously as a public space, an access provider, a multi-modal route, and a service and utility route. The road corridor design must address the road user needs, the land use context and the available corridor width.

With the input of a knowledgeable working group, design guidelines have been provided for various individual road corridor components. These include elements located on adjacent lands, the road edge, and the roadway, as well as intersections, driveways, pedestrian crossings and linear services. These components can then be assembled to form complete road cross-sections and plans. The process involves mixing and matching those component designs that best achieve the desired road character and corridor width. Demonstration plans have been illustrated for six basic road types, but other corridor designs are possible.

The study provides an implementation framework that can be used to set the guidelines into practice. The usefulness of the guidelines will best be measured when used in upcoming road corridor design projects. These may involve new roads, widenings, or road retrofits. It is acknowledged that the guidelines should be reviewed from time to time to incorporate emerging best practices and new lessons learned.

Combined with strong policy and a commitment to high quality design, these guidelines will be a powerful tool to help make Ottawa-Carleton's diverse regional road corridors the best public spaces they can possibly be.

Appendix

APPENDIX

Existing Policies, Regulations, Guidelines and Standards
(Regional, Municipal, Provincial, Professional)

The following table outlines various existing policies, regulations, guidelines and standards that road designers and decision-makers should have regard for in the design of regional road corridors in Ottawa-Carleton.

Responsible Authority	Document, Date	Relevance to Regional Road Corridor Design
Region Of Ottawa-Carleton	*Regional Official Plan, 1997*	- establishes the Region's official policy, enacted pursuant to Ontario's Planning Act, 1990, and Provincial Policy Statement, 1995. - outlines an overall regional development strategy which encourages denser, more compact growth and affordable infrastructure. - promotes a multi-modal transportation system, with an emphasis on walking, cycling and transit. - requires sidewalks on both sides of regional roads except in business parks where they are required only on one side. - establishes ROW acquisition/widening policies for regional roads. - provides policy on when noise attenuation is warranted.
Region Of Ottawa-Carleton	*Transportation Master Plan, 1997*	- confirms required transportation infrastructure improvements, including new and widened regional roads. - provides a program for regional road construction and reconstruction. - establishes modal share for all modes.
Region Of Ottawa-Carleton	*Regional Regulatory Code, 1992*	- provides Council-approved standards on various matters including the use and care of regional roads, private approaches, road cuts, encroachments, street vending, signs, sewer and water services, and tree planting.
Region Of Ottawa-Carleton	*Greening Guidelines For Regional Roads in Urban Areas, 1992*	- provides guidelines on various matters such as planting standards, tree removal & replacement, tree protection, turf, utility conflicts, life cycle management, and research required. - recommends 20m linear tree spacing along regional roads. - provides typical cross-sections of different road edge and median planting arrangements.
Region Of Ottawa-Carleton	*Noise Control Guidelines For New Construction, Reconstruction and Widening of Regional Roads and Transitways, 1995*	- provides Council-approved guidelines on the provision of noise mitigation features to be implemented during the design and construction of new or widened regional roads and transitways. - requires the Region to construct noise mitigation measures, within the ROW, when warranted pursuant to MTO/MOEE guidelines. - requires the Region to construct "privacy fences" in other cases.

Region Of Ottawa-Carleton	*Noise Control Guidelines for New Developments Adjacent to Existing and Proposed Regional Roads and Transitways, 1993*	- provides Council-approved guidelines on the provision of noise mitigation features, by private developers, for new developments along regional roads and transitways. - requires applicants to conduct noise studies. - specifies that noise attenuation measures, if warranted, are to be constructed by the applicant outside of the ROW.
Region Of Ottawa-Carleton	*Roadway Lighting Information Booklet,*	- provides guidelines on illumination levels, light spacing and light fixture options
Area Municipalities	*Local Official Plans*	- establishes policies for land uses adjacent to regional roads. - designates pedestrian routes. - includes detailed secondary or special area plans.
Area Municipalities	*Local Zoning By-Laws*	- establishes permitted land uses and performance standards such as road setbacks, landscaping strips, parking requirements, building heights, and densities.
Area Municipalities	*Municipal Sign By-Laws*	- regulates the surface area, height, number, and location of signs on private property. - prohibits certain types of signs.
Area Municipalities	*Site Plan Design Guidelines*	- provides recommendations on building orientation, buffering landscaping, parking areas, access, walkways, cyclist amenities, garbage enclosures, lighting, and signage, etc. .
Ontario Ministry of Housing & Ministry of Municipal Affairs	*Making Choices: Alternative Development Standards Guideline, 1995*	- outlines the need for alternative development standards in road design. - presents a hierarchy of ten street types ranging from more urban to less urban, on ROWs ranging from 12.5m to 30m.
Ontario Ministry of Ministry of Municipal Affairs	*Design Guidelines - Highway Commercial Areas, 1988*	- outlines the visual and functional problems with some highway commercial areas. - provides guidelines for such areas on various matters such as on-site parking, landscaping, signs, buildings, and vacant sites.
Ontario Ministry of Transportation	*Ontario Bikeways Planning and Design Guidelines, March 1996*	- provides guidelines on the use of shared road bikeways, shoulder bikeways, bike lanes, and bike paths. - provides recommended bikeway widths as a function of average daily roadway traffic and % of truck traffic.
Transportation Association of Canada (TAC)	*Geometric Design Guide for Canadian Roads, 1999*	- provides a comprehensive set of design standards for components in the road edge, the roadway, intersections and crosswalks, and the linear services and road operation requirements.
Transportation Association of Canada (TAC)	*Canadian Guide to Neighbourhood Traffic Calming, 1998*	- provides design guidelines for traffic calming measures.
Dr. Barry Wellar University of Ottawa	*Walking Security Index Project. Final Report, July 1998*	- provides a method to define, predict and evaluate the level of security (safety, comfort and convenience) that is experienced and expected by pedestrians when using signalised intersections.

Glossary

GLOSSARY

Word (Short Form)	Definition
Adjacent Lands	Lands within the road corridor that are adjacent to the ROW. The depth varies from 20m to more than 100m depending on the land use.
Bike Pocket	A clear space behind the stop bar at intersections for the temporary stopping of bicycles at red lights.
Boulevard	The area between the ROW limit and the curb. Also referred to as "road edge" in this document. See also "inner boulevard" and "outer boulevard".
Building Height-to-corridor width Ratio	The ratio of building height to the distance separating building facades on either side of the road. If buildings are 8m high and separated by 24m, the ratio is 1:3.
Crosswalk	Any instance where a sidewalk crosses a public street or private driveway. Crosswalks may be at intersections or at mid-block locations.
Curb-face Inlets	A device that receives surface water runoff and directs it to an underground storm sewer. The inlet is a cast iron structure that is mounted along the roadside edge of a concrete curb. It is an alternative to a catch basin.
Flankage	The frontage of a road which is bounded by the side yard of an adjacent lot.
Heavy Vehicles	Vehicles such as large trucks, buses, and emergency service vehicles.
Inner Boulevard	That portion of the road edge between the curb and the sidewalk.
Life-Cycle Cost	The cost of constructing, operating, maintaining, and replacing an item as measured over the life-span on an annualized basis.
Lot Frontage	The portion of a lot that abuts a road ROW.
Median	The feature that separates opposing travel lanes. Medians may be raised/curbed with a sod or concrete top, may be mountable with a concrete top, or may be painted lines on asphalt. Median width typically varies between 1m and 5m.
Noise Attenuation Fence	A solid fence or wall with a composition which reduces the intensity of sound between the source and the receiver.
On-road Parking	Parking that is permitted along the roadway either as permanent parking spaces or on a joint use parking/peak hour through-lane.
On-Site	Lands abutting the ROW.
Outer Boulevard	That portion of the road edge between the sidewalk and the ROW limit.
Planting Zone	Same as Outer Boulevard.

Glossary

Recreational Pathway	An off-road route for pedestrians, cyclists and other non-motorized users. It links communities, open spaces and recreational destinations.
Region	The Region of Ottawa-Carleton
Regional Official Plan (ROP)	The Region's Official Plan as approved by the Minister of Municipal Affairs and Housing in October, 1997, and the Ontario Municipal Board in April 1999.
Regional Road Corridor	The ROW and adjacent land uses along either side, measured to the building façade.
Right-of-Way (ROW)	The corridor of land owned by a municipality within which a road is located. This includes the road pavement and boulevards on either side. The ROW width typically varies from 20m to 45m.
Road Allowance	Same as Right-of-Way (ROW)
Roadway	The central, paved traveled portion of the road, including medians where they exist.
Road Edge	The area within the ROW limit and the curb. Also referred to as "boulevard" in this document. See also "inner boulevard" and "outer boulevard".
Salt-Tolerant Species	Vegetation species that are tolerant to the effects of high concentrations of salt in the air (spray), soil, or groundwater.
Snow Management	The process of storing, clearing, and removing snow that accumulates on roadways, sidewalks, recreation paths, driveways and parking lots.